

Arctic

National Wildlife Refuge

**Comprehensive
Conservation
Plan**

**Environmental
Impact
Statement**

**Wilderness
Review**

**Wild River
Plans**

Final



IN REPLY REFER TO:

PL/0213S

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503



SEP 12 1982

Dear Reader:

Enclosed is the Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plans (Plan) for the Arctic National Wildlife Refuge, Alaska. The Plan has been prepared pursuant to Sections 304(g), 605, 1008, and 1317 of the Alaska National Interest Lands Conservation Act of 1980 (the Alaska Lands Act), Section 3(d) of the Wilderness Act of 1964, and Section 102(2)(C) of the National Environmental Policy Act of 1969. When producing long-term management plans for the nation's national wildlife refuges, the U.S. Fish and Wildlife Service (the Service) actively seeks comments from the general public on the development of management alternatives and on the choice of a preferred management strategy. The Plan includes seven alternative strategies for long-term management of the Arctic National Wildlife Refuge.

Management of national wildlife refuges in Alaska must conform to the legal and administrative requirements that are listed in the first section of this document. Those that have a direct impact on the development of a long-range plan and on the choice of the preferred management alternative are discussed below.

According to the National Wildlife Refuge System Administration Act and Section 304(b) of the Alaska Lands Act, no discretionary use of a national wildlife refuge will be permitted by the Service unless it is first determined to be compatible with the purposes for which the refuge was established. Uses specifically mandated by Congress, or for which separate legal standards are legislatively established, are exempt from the compatibility requirement. Section 304(g) of the Alaska Lands Act requires the preparation of a comprehensive conservation plan for each unit of the National Wildlife Refuge System established or enlarged by the Act. Such a plan designates areas within a refuge according to their resources and values, outlines programs for conserving fish and wildlife resource values, and specifies uses within each area that may be compatible with the major purposes of the refuge. Furthermore, such a plan discusses opportunities that will be made available for fish and wildlife oriented recreation, ecological research, environmental education and interpretation, and economic use of refuge lands.

In addition to presenting the Service's long range management strategies for the Arctic Refuge, the Plan evaluates the effect of the proposed management alternatives on subsistence uses and needs, as required by Section 810 of the Alaska Lands Act. The law requires the Service to evaluate the effects on subsistence use and needs before implementing any part of a plan that would withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands. The Service is required to give notice and hold public hearings on any action that would "significantly restrict" subsistence uses. Public hearings to be held in conjunction with the development of the Plan, the Section 810 evaluation found as part of the text, and the consideration of comments received on the Plan are designed to meet these requirements.

The question of oil and gas development on the Arctic Refuge, particularly development of the coastal plain, is of special interest to many groups. Section 1003 of the Alaska Lands Act specifically prohibits oil and gas leasing, development, and production anywhere on the Arctic Refuge. Until Congress takes action to change this provision, the Service will not permit oil and gas leasing in the refuge under any of the alternatives in the Plan. When Congress makes a management decision, that action will be incorporated into the Plan and implemented.

The Plan covers all of the Arctic Refuge, including the "1002" coastal plain area. However, actions that Congress might take in the "1002" area, including permitting oil and gas development or designating the area as wilderness, are not addressed in this document. Section 1002(h) of the Alaska Lands Act directed the Department of the Interior to provide the Congress with a separate report on the future management of the "1002" area. The 1002(h) report and legislative environmental impact statement, submitted to Congress on June 1, 1987, analyzes five alternatives and contains the Secretary of the Interior's recommendation that the entire area be made available for leasing. The Congress will determine the future management of the "1002" area. In the interim, in all of the alternatives in the Plan the 1.5 million acres of federally managed lands in the "1002" area are treated as a minimal management area.

During the process of developing plans for Alaska refuges, the public has an opportunity to suggest what additional lands, if any, should be placed in the National Wilderness Preservation System. Section 1317 of the Alaska Lands Act requires the Service to review all non-designated lands in the National Wildlife Refuge System in Alaska to determine their suitability or non-suitability as wilderness.

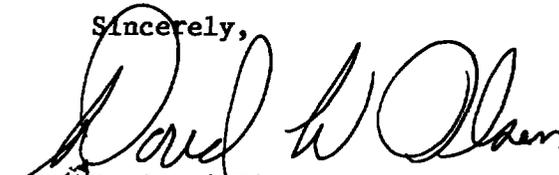
Although large tracts of land on Alaska refuges may be found to be suitable as wilderness, not all land that is suitable will be proposed for wilderness designation because of the management strategies that will be used to meet refuge purposes. As a result, the range of wilderness alternatives is evaluated subsequent to the Service's selection of its preferred management alternative. A wilderness proposal is examined for each of the management alternatives in the Plan.

Congress established more than 19 million acres of wilderness on Alaska refuges with the passage of the Alaska Lands Act. Therefore, the criteria used to determine what land the Service additionally proposed for wilderness designation include (1) the need for wilderness unit boundary adjustment and (2) the addition of selected areas with outstanding resource values that may have been inadvertently overlooked during the original wilderness review and subsequent designations undertaken by Congress. A summary of public comments on the Service's recommended wilderness proposal is included in the final Arctic Refuge Comprehensive Conservation Plan, which is part of the wilderness package sent to Congress.

Comments provided on the draft Plan have been taken into account in preparation of this Plan. A record of decision will be published no sooner than 45 days following the publication of the document, and the Service will begin implementing the management directions in the preferred alternative.

Requests for further information should be directed to the Regional Director, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503, Attention: Bill Knauer, or contact Mr. Knauer at (907) 786-3399.

Sincerely,



David W. Olsen
Regional Director

Enclosure

NOTICE TO READER

Section 304(g) of the Alaska National Interest Lands Conservation Act (the Alaska Lands Act) of 1980 directed the Secretary of the Interior to prepare a comprehensive conservation plan for the 19-million-acre Arctic National Wildlife Refuge in northeastern Alaska. This plan is being prepared to fulfill that requirement.

Section 1002 of the Alaska Lands Act further directed the Secretary of the Interior to:

- o conduct biological and geological studies of the 1.5-million-acre coastal plain of the Arctic National Wildlife Refuge (the "1002" area);
- o report the results of those studies to the Congress; and
- o recommend to the Congress whether the "1002" area should be made available for oil and gas exploration and development.

The 1002(h) report and legislative environmental impact statement--which analyzes five alternatives and contains the Secretary of the Interior's recommendation--was submitted to the Congress on June 1, 1987. The five alternatives in the report include:

- o Alternative A--which would make the entire "1002" area available for oil and gas exploration and development;
- o Alternative B--which would limit the amount of the "1002" area available for exploration and development by excluding the upper Jago River area;
- o Alternative C--which would provide for further exploration before the Congress enacts leasing authority;
- o Alternative D--which would allow the management of the "1002" area to continue under existing legal authority guided by the Arctic Refuge comprehensive conservation plan, requiring no additional congressional action; and
- o Alternative E--which calls for designation of the "1002" area as wilderness pursuant to the 1964 Wilderness Act and the Alaska Lands Act.

In the report the Secretary of the Interior recommended that the Congress enact legislation directing him to conduct an orderly oil and gas leasing program for the entire "1002" area (Alternative A) at such a pace and in such circumstances as he determines will avoid unnecessary adverse effect on the environment. Thus, future management of the "1002" area is currently in the hands of the Congress. This includes the potential for wilderness management of these lands as directed by the Alaska Lands Act, Title 13, Section 1317.

The Fish and Wildlife Service (the Service) is presently managing the "1002" area as it has done in the past, essentially as a minimal management area. Until the Congress takes action on the future of the "1002" area the Service will continue this practice. In all alternatives included in this comprehensive conservation plan for the Arctic Refuge, the "1002" area is treated as a minimal management area. Actions that the Congress may take in the "1002" area--including making it available for oil and gas exploration and development or designating it as wilderness--will not be addressed in this plan. Any decision made by the Congress regarding the future management of the "1002" area will be incorporated into this plan and implemented. Should any additional studies or a wilderness review of the "1002" area be required, they will be undertaken and completed at that time (see also the "Wilderness Review of the 1002 Area" in the Introduction).

ARCTIC NATIONAL WILDLIFE REFUGE
FINAL COMPREHENSIVE CONSERVATION PLAN,
ENVIRONMENTAL IMPACT STATEMENT,
WILDERNESS REVIEW, AND
WILD RIVER PLANS

September, 1988

U.S. FISH AND WILDLIFE SERVICE
REGION 7, 1011 E. TUDOR RD.
ANCHORAGE, AK 99503



The 19-million acre Arctic National Wildlife Refuge is located on the extreme northeastern corner of Alaska. This draft comprehensive conservation plan and environmental impact statement describes seven alternatives for managing the Arctic National Wildlife Refuge, and evaluates the effects of implementing each alternative. An alternative reflecting current management (no action), is included. The U.S. Fish and Wildlife Service's preferred alternative is identified and the criteria used in its selection are described. The document also includes a wilderness review, which evaluates the suitability of lands for wilderness designation, and management directions for the Ivishak, upper Sheenjek and Wind rivers, three units of the National Wild River System.

For further information contact William W. Knauer (907) 786-3399.

THE ALASKA LANDS ACT REQUIREMENTS

Section 304(g) of the Alaska Lands Act requires the preparation of a comprehensive conservation plan (CCP) for each unit of the National Wildlife Refuge System established or enlarged by the Alaska Lands Act. These plans are to designate areas within the refuge according to their respective resources and values, specify the programs for conserving fish and wildlife resource values, and specify the uses within each area that may be compatible with the major purposes of the refuge. The plan also will set forth those opportunities that will be provided within the refuge for fish and wildlife-oriented recreation, ecological research, environmental education and interpretation of refuge resources and values, and economic uses.

FISH AND WILDLIFE SERVICE PLANNING DOCUMENTS

The Fish and Wildlife Service planning process for each refuge involves a number of stages progressing from the development of a broad comprehensive conservation plan/environmental impact statement/wilderness review, to the formulation of detailed management plans for implementing specific components of the comprehensive conservation plan.

The comprehensive conservation plan addresses topics of resource management, visitor use, refuge operations, and development in general terms. The wilderness review determines which lands are suitable for inclusion in the National Wilderness Preservation System. The goal of this plan is to establish a consensus between the Service and interested agencies, groups, and individuals about the types and levels of visitor use, development and resource management that will occur. These decisions are based on the purposes of the refuge, its significant values, the activities occurring there now, and the resolution of any major issues surrounding possible land use conflicts within and adjacent to the refuge. Detailed management plans are prepared after completion of the CCP.

Refuge management plans identify the actions that will be taken to preserve and protect natural and cultural resources. Examples include a fishery management plan, a wildlife habitat management plan, a fire management plan, a land protection plan, and a public use management plan.

Annual work plans identify specific tasks or projects to be completed in the current year to implement the detailed management plans.

Public involvement and cooperative planning efforts are continued through the completion of the detailed management plans.

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SUMMARY

SUMMARY

INTRODUCTION

The Final Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review/Wild River Plan (the plan) describes seven alternatives for managing the Arctic National Wildlife Refuge, and identifies the possible consequences of implementing the alternatives. Each alternative provides broad policy guidance for managing the refuge. The plan also includes an evaluation of the wilderness suitability of all the lands south of the existing Arctic Refuge Wilderness and the "1002" area. Each management alternative includes a wilderness proposal based in part on this review. Finally, the plan includes management directions for the three designated wild rivers within the refuge (the Ivishak, upper Sheenjek, and Wind rivers).

The Arctic Refuge encompasses about 19.5 million acres (7.9 million ha) in northeastern Alaska, of which 19.2 million acres (7.7 million ha) are in federal ownership--an area almost as large as all of New England. Fairbanks, the largest city near the refuge, is about 180 air miles (290 km) south of the refuge boundary. The Arctic Refuge is the most northerly unit, and the second largest, in the National Wildlife Refuge System. The refuge is the only area in the United States where people may practicably travel on foot or by boat and traverse a full range of boreal forest, mountain, and north slope landscapes and habitats because of the close proximity of the arctic coast and mountains. The four tallest peaks in the Brooks Range, and the largest number of glaciers, occur here. The northern slope descends to the Beaufort Sea and a series of barrier islands and lagoons on the coast. Valleys are dotted with lakes, sloughs and wetlands. Groves of stunted black spruce grade into tall dense spruce forests in the Porcupine River area in the southeastern portion of the refuge. The refuge includes fish and wildlife species common to arctic and subarctic Alaska. Major portions of the calving ground for the Porcupine caribou herd, one of the largest in Alaska, and critical habitat for the endangered peregrine falcon are found here. Polar bear den on refuge land. Other wildlife species found in the refuge include snow goose, tundra swan, golden eagle, snowy owl, gyrfalcon, muskox (reintroduced into the refuge), Dall sheep, brown and black bear, wolf, wolverine, arctic fox, lynx, marten, snowshoe hare, and moose. Arctic grayling, lake trout, arctic char, chum, chinook, coho and pink salmon, whitefish, northern pike, burbot and arctic cod are found in the area's waters. The waters offshore of the refuge harbor summering bowhead whales, and the coastal lagoons provide year-round habitat for polar bear and ringed and bearded seals.

The Arctic National Wildlife Range was established on December 9, 1960, when Secretary of Interior Fred A. Seaton signed Public Land Order 2214. The order set aside 8.9 million acres (3.6 million ha) in the range. In 1971, Congress enacted the Alaska Native Claims Settlement Act (ANCSA). Under the provisions of this statute, the Secretary of Interior proposed 3.7 million acres (1.5 million ha) be added to the existing Arctic National Wildlife Range. (This proposal was ultimately incorporated into the Alaska National Interest Lands Conservation Act.) Also under the Native Claims Act (and the Alaska Lands Act), the Kaktovik Inupiat Corporation (KIC) has statutory entitlement to ownership of about 92,000 surface acres (37,000 ha) along the coast; the subsurface estate for this area was conveyed to the Arctic Slope Regional

Corporation (ASRC) in 1983, 1984, and 1986 pursuant to a land exchange agreement.

In December, 1980, Congress enacted the Alaska National Interest Lands Conservation Act (the Alaska Lands Act). This act, among other things, redesignated the original 8.9 million-acre (3.6-million hectare (ha)) Arctic National Wildlife Range as the Arctic National Wildlife Refuge. All the lands, waters, interests and whatever submerged lands, if any, that were retained in federal ownership at the time of statehood were included in the refuge. The Alaska Lands Act added to the original refuge about 9.1 million acres (3.7 million ha) of adjoining public lands west to the Trans-Alaska Pipeline and south to the Yukon Flats National Wildlife Refuge. The upper Sheenjek, Wind and Ivishak rivers were designated as wild rivers. An area of about 8 million acres (3 million ha), comprising most of the original refuge, was designated as wilderness, while 1.5 million acres (607,000 ha) on the arctic coastal plain was opened under Section 1002 to a limited exploration program for oil and gas sufficient for a preparation of a report to Congress. Leasing, development and production of oil and gas in the refuge were prohibited by Section 1003 of the Alaska Lands Act, unless authorized by further congressional action.

The Alaska Lands Act declared the purposes for which Arctic Refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including the participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;
- (ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

PLANNING PROCESS

The first step in developing a comprehensive conservation plan for the Arctic Refuge was to collect information. Field inventories, remote sensing, and literature searches produced information about refuge resources and uses. Public meetings, workshops, and other means were used to learn what people were concerned about, and what they felt should be done on the refuge. All available information was then analyzed with the help of resource specialists from several agencies and the private sector to identify special values, problems and issues as required by the Alaska Lands Act.

The Service identified a number of special values in Arctic Refuge, including: wilderness qualities; ecological values; geological/paleontological resources; and scenic/recreational values. Examples of areas with these special values include: upper Sheenjek, Ivishak and Wind wild rivers; ramparts of the Porcupine River; Atigun Canyon; Firth River-Mancha Creek Research Natural Area; Okpilak River valley; Old John Lake; Peters and Schrader lakes; Porcupine Lake; Sadlerochit Mountains and Warm Springs area; Shublik Spring and Canning Forest; upper Coleen River; Beaufort Lagoon-Icy Reef-Kongakut River area; Ignek Mesa; Echooka River; Fire Creek; and Ignek Creek.

The Service identified ten concerns that may affect management of the Arctic Refuge in the future: oil and gas development within the refuge; mining within the refuge; development and use of adjacent lands; use and development of private inholdings within the refuge boundary; illegal harvesting of wildlife; impacts to fish and wildlife due to increasing public use; conflicts between users; loss of wilderness values; subsistence, commercial and sport harvests of fish; and the need for additional resource and user data.

The Service conducted an extensive public involvement program in developing this plan. Issues and concerns raised by the public included: protection of fish and wildlife resources; maintaining subsistence opportunities; protecting wilderness qualities; providing for oil and gas activities; providing for access and transportation; impacts of recreational use; impacts of researchers; use and development of Native allotments and inholdings; the effect of proposed land exchanges; providing for cabins; the Service's management of the refuge; and the refuge planning process.

After reviewing the issues raised by the public, including refuge users, local residents, and the State, and agency management concerns, the Service identified eight significant issues for the comprehensive conservation plan:

- o What effect will the plan have on the refuge's fish and wildlife populations and habitats, particularly the Porcupine caribou herd?
- o What effect will the plan have on the designation of additional wilderness in the refuge?
- o What effect will the plan have on the refuge's wilderness values?
- o What effect will the plan have on aircraft and other motorized access into the refuge?
- o What effect will the plan have on public use (guided and unguided recreational use) levels in the refuge?
- o What effect will the plan have on oil and gas activities south of the "1002" area?
- o What effect will the plan have on mining of active claims on refuge lands?
- o What effect will the plan have on other economic uses, such as commercial timber harvesting?

The Service identified 14 potential issues relating to designating additional portions of the Arctic Refuge as wilderness, of which four were determined to be significant:

- o What effect would wilderness designation have on the refuge's wilderness values?
- o What effect would wilderness designation have on oil and gas activities south of the "1002" area?
- o What effect would wilderness designation have on mining of active claims on refuge lands?
- o What effect would wilderness designation have on commercial timber harvesting?

Public Comments on the Draft Plan

In response to comments on the draft plan by government agencies, Native corporations, special interest groups, and the general public, the Service has revised the document. The following major changes were made in the draft document:

- o The Alternative D, E and F wilderness proposals were modified to address concerns expressed by the International Porcupine Caribou Commission and Arctic Village. Refuge lands around Old John Lake, on the Junjik River from Timber Lake to its confluence with the East Fork of the Chandalar River, along the East Fork of the Chandalar River north to Red Sheep Creek, and on the lower Wind River have been deleted from the wilderness proposals. In addition, the proposed wilderness boundary in the southeast corner in Alternative E was drawn back to the Porcupine River.

MANAGEMENT OF THE "1002" COASTAL PLAIN AREA

All discussions of the resources, uses, and consequences of those uses in the "1002" coastal plain area are addressed in the 1002(h) report (Clough, Patton and Christiansen, 1987). The Service is presently managing the "1002" area as it has done in the past, essentially as a minimal management area. Until the Congress takes action on the future of the "1002" area the Service will continue this practice. In all alternatives included in this comprehensive conservation plan for the Arctic Refuge, the "1002" area is treated as a minimal management area. Actions that the Congress may take in the "1002" area--including making it available for oil and gas exploration and development or designating it as wilderness--will not be addressed in this plan. Any decision made by the Congress regarding the future management of the "1002" area will be incorporated into this plan and implemented. Should any additional studies or a wilderness review of the "1002" area be required, they will be undertaken and completed at that time (see also the "Wilderness Review of the 1002 Area" in the Introduction).

MANAGEMENT OF NATIVE CONVEYED LANDS SUBJECT TO SECTION 22(g)

The 92,000 acres (37,000 ha) of lands owned by Kaktovik Inupiat Corporation (KIC) and Arctic Slope Regional Corporation (ASRC) are subject to the provisions of Section 22(g) of the Alaska Native Claims Settlement Act (ANCSA). The Service is concerned with protecting the important resource values of these private lands, while also enabling the Native landowners to derive economic benefits from their land. Oil and gas activities on the Native corporation lands which are subject to the terms of the Chandler Lake land exchange agreement will be subject to environmental standards established

by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to ensure that Native and federal interests on 22(g) lands are protected.

COMMON MANAGEMENT DIRECTIONS

Management of the refuge under any alternative is governed by federal laws, Service policies, and principles of sound resource management--all of which restrict the range of potential activities. Accordingly, certain management directions must be implemented in all of the management alternatives for Arctic Refuge. These common management directions include:

- o maintaining the Firth River-Mancha Creek and Shublik research natural areas in a natural condition, with no improvement or disturbance of the habitats;
- o maintaining the Neruokpuk Lakes Public Use Natural Area essentially unmodified for public use.
- o managing the Ivishak, upper Sheenjek, and Wind wild rivers to protect their biological, physical, esthetic, historic, archeologic, and scenic features, and to provide opportunities for research and recreation;
- o coordinating management with other resource management agencies, and cooperating with owners of refuge inholdings and adjacent lands;
- o working with the State to ensure that all Service actions taken under this plan are consistent, to the maximum extent practicable, with the State approved coastal zone management plan;
- o collecting data on fish and wildlife species, public use, and other topics that are of high management concern;
- o ensuring that fish and wildlife populations and ecological relationships necessary to conserve natural diversity are maintained;
- o working with the Alaska Department of Fish and Game (ADF&G) to maintain or increase the refuge's arctic peregrine falcon, caribou, Dall sheep, muskox, moose, black and brown bear, wolf, and furbearer populations;
- o ensuring that water quality and quantity and air quality are protected in compliance with federal and state laws and regulations;
- o ensuring that all significant historic, archeological, paleontological, and cultural resources on the refuge are protected and managed in accordance with federal and state laws;
- o ensuring that subsistence opportunities are maintained by assessing potential impacts of proposed uses or activities, conducting research, enforcing regulations, and monitoring fish and wildlife populations and uses;

- o maintaining opportunities for hunting, fishing, trapping, and other wildlife-oriented activities on the refuge;
- o allowing reasonable access onto the refuge so visitors can participate in fish and wildlife-oriented recreational activities;
- o permitting the use of snowmachines (during periods of adequate snow cover), motorboats, airplanes, and non-motorized surface transportation methods for traditional activities on refuge lands and for travel to and from villages and homesites, subject to reasonable regulations;
- o prohibiting production of oil and gas leasing or other development leading to production of oil and gas, and construction of oil and gas support facilities in the refuge, unless authorized by Congress; and
- o permitting guides and outfitters to use the refuge, subject to stipulations to reduce the potential for resource impacts.

ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

The following section briefly describes the alternatives and the environmental consequences that could result from their implementation. The alternatives are general in nature and provide broad strategies for management of refuge resources and users. Each of the alternatives designates areas within the refuge using management categories described in Chapter V. To evaluate the effects of each alternative the Service developed seven scenarios that describe events likely to occur on the refuge. These scenarios, and the definitions of the magnitudes of the impacts, are described in Chapter VI. All of the scenarios assume increased public use of the refuge. Five of the seven scenarios assume one placer mine would be developed at an existing active claim. Two scenarios (Alternatives B and C) assume small-scale commercial timber harvesting would occur on the Porcupine River, and one scenario (Alternative B) assumes an oil development on the Porcupine Plateau (with congressional approval).

ALTERNATIVE A (THE CURRENT SITUATION AND PREFERRED ALTERNATIVE)

Alternative A is the Service's preferred alternative for managing the Arctic Refuge. This alternative, the "no action" alternative, would maintain the existing range and intensity of management and recreational and economic uses. Alternative A would protect and maintain the refuge's fish and wildlife values and natural diversity. Disturbances of fish and wildlife habitats and populations would be minimized. Opportunities for trapping, hunting, fishing, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. The existing Arctic Refuge Wilderness would continue to be managed in accordance with the provisions of the Wilderness Act as amended by the Alaska Lands Act. No additional areas would be proposed for wilderness designation.

Management Directions

Alternative A would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational activities;
- o permit guides and outfitters to operate in the refuge;
- o permit oil and gas studies where compatible with refuge purposes; and
- o propose no additional areas for wilderness designation.

Environmental Consequences of Alternative A^{a/}

Vegetation

- o No significant adverse effect on vegetation.

Fish and Wildlife

- o Negligible effects on fish, waterfowl, shorebirds, raptors, marine mammals, caribou, moose, Dall sheep, and furbearers.
- o Minor adverse impacts to the refuge's raptors, black and brown bears.
- o No effect on most of the refuge's threatened and endangered species; minor to negligible adverse impacts to the threatened and endangered peregrine falcon subspecies from recreational use.

Water Quality and Quantity

- o Minor adverse impact to water quality in localized areas from increased public use.
- o No significant changes in water quantity.

Air Quality

- o No significant changes in air quality.

Ecosystems

- o Negligible effect on the refuge's ecosystems.

Population and Economy

- o Negligible change in the population of the local communities.
- o Negligible benefits to the local economy, primarily from recreation-related businesses.

Subsistence

- o No significant adverse effect on important resources or the harvest of these resources.

^{a/}The assessment of Alternative A assumes valid mining claims would remain undeveloped.

Recreation

- o Negligible overall effect on recreation within the refuge.
- o Minor adverse impact on recreation in localized areas (i.e., Atigun Gorge, Hulahula River) due to increased public use.

Cultural Resources

- o Negligible overall effect on cultural resources.

Environmental Consequences of the Wilderness Proposal (No new areas proposed)

Wilderness Values

- o Wilderness values would be maintained in over 99% of the refuge.
- o In a few localized areas (e.g., Atigun Gorge, Kongakut River, Hulahula River) increased public use could diminish wilderness values.

Oil and Gas Activities South of the "1002" Area

- o No effect on potential oil and gas activities; only oil and gas studies could be permitted, with restrictions in the Arctic Wilderness and the wild river corridors.
- o Oil and gas leasing and development would continue to be prohibited unless Congress amends the Alaska Lands Act.

Mining Development

- o No effect; only 9 active claims exist on the refuge that could be developed.

Commercial Timber Harvesting

- o No effect; this use would be precluded as all of the federal lands in the refuge would be designated wilderness, minimal management, or wild river management areas.

ALTERNATIVE B

This alternative was developed in response to comments from the Resource Development Council for Alaska during the planning process. Under Alternative B the Service would continue to protect key fish and wildlife populations and habitats, while providing opportunities for commercial timber harvesting on refuge lands south of the Brooks Range. This alternative also would include a recommendation to Congress that all lands in intensive and moderate management be made available for oil and gas leasing. Extensive stipulations and mitigation work would be required to minimize adverse impacts from these economic uses. The use of habitat improvement techniques, including mechanical manipulation, could be permitted in designated areas in this alternative. The Service would manage public use in the refuge as it has in the past, subject to restrictions which would be required with development activity. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service would recommend that no additional refuge lands be proposed for wilderness designation under Alternative B.

Alternative B shares the following management directions with Alternative A (the Current Situation). Alternative B would:

- o maintain the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o permit oil and gas studies where compatible with refuge purposes; and
- o propose no additional areas for wilderness designation.

The following management directions indicate the major differences in Alternative B from Alternative A. Alternative B would:

- o provide opportunities for commercial timber harvesting in designated areas in the refuge;
- o provide opportunities for oil and gas leasing on the Porcupine Plateau pursuant to Section 1008 of the Alaska Lands Act if Congress repeals Section 1003 of the Alaska Lands Act; and
- o provide opportunities for habitat improvements, including mechanical manipulation, if necessary in the future.

Environmental Consequences of Alternative B

Vegetation

- o Overall, minor adverse impacts to the refuge's vegetation.
- o Major, long-term adverse impacts to vegetation in localized areas from mining and oil development, and minor adverse impacts from timber harvesting operations.

Fish and Wildlife

- o From a refuge-wide perspective, negligible impacts to waterfowl, shorebirds, marine mammals, moose, Dall sheep, muskox, black and brown bear, and furbearers; minor adverse impacts to fish, raptors, and caribou.
- o Moderate adverse impacts to caribou and raptors possible in localized areas from oil development, and timber harvesting; moderate to major adverse impacts to fish in localized areas from oil development and mining.
- o No effect on most of the refuge's threatened and endangered species; potential for a moderate, long-term, adverse impact to the endangered American peregrine falcon that occurs on the refuge.

Water Quality and Quantity

- o Negligible overall impact to water quality and water quantity.
- o Minor to major adverse impacts to water quality and quantity possible in localized areas from public use, timber harvesting, mining and oil development.

Air Quality

- o Negligible changes overall in air quality.
- o Minor adverse impacts to air quality possible in localized areas from oil development.

Ecosystems

- o Minor adverse impact overall on the refuge's ecosystems.
- o Mining and oil development would have a moderate adverse impact on ecosystems on a site-specific basis.

Population and Economy

- o Negligible overall change in the population of the local communities, with moderate short-term population increases in Fort Yukon.
- o Moderate short-term benefits to the local economy, primarily in Fort Yukon from oil development activities; some benefits to the local, state, and federal governments from oil leasing.
- o Negligible benefits to the local economy from mining and commercial timber harvest operations.

Subsistence

- o Overall, negligible effect on subsistence resources and harvests.
- o Timber harvesting on the Porcupine River has the potential to result in temporary minor adverse impacts to trapping.
- o Oil development has the potential to significantly restrict the activities of some Arctic Village and Venetie residents in localized areas in the refuge.

Recreation

- o Minor effect overall on recreation within the refuge.
- o Minor adverse impact on recreation in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages) due to increased public use.
- o Oil development could reduce or eliminate opportunities to recreate in localized areas, and increase the level of recreational use.

Cultural Resources

- o Negligible effect on cultural resources with cultural resource inventories and the application of mitigation measures.

Environmental Consequences of the Wilderness Proposal (No new areas proposed)

Wilderness Values

- o Wilderness values would be maintained in over 95% of the refuge.
- o In a few localized areas (e.g., Atigun Gorge, Kongakut River, Hulahula River) increased public use could diminish wilderness values.
- o Oil development, commercial timber harvesting, and mining could adversely affect refuge wilderness values in localized areas.

Oil and Gas Activities South of the "1002" Area

- o No effect on potential oil and gas activities; oil and gas studies could be permitted, with restrictions in the Arctic Wilderness and wild river corridors.
- o Oil and gas leasing and development could be permitted under Section 1008 of the Alaska Lands Act if Congress repeals Section 1003 thereof.

Mining Development

- o No effect; only 9 active claims exist on the refuge that could be developed.

Commercial Timber Harvesting

- o No effect; this use could be permitted in the intensive and moderate management areas (up to 29% of the refuge) if compatible with refuge purposes.

ALTERNATIVE C

Alternative C was developed in response to comments from the Resource Development Council for Alaska during the planning process. In Alternative C the Service would continue to protect key fish and wildlife populations and habitats while providing opportunities for commercial timber harvesting on refuge lands on the Porcupine Plateau, south of the Brooks Range. Alternative C differs from Alternative B in that all lands in the moderate management category would remain closed to oil and gas leasing. This alternative also would keep open options for habitat improvements, including mechanical manipulation, in designated areas. The Service would manage public use in the refuge as it has in the past. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service would recommend that no additional refuge lands be proposed for wilderness designation under Alternative C.

Alternative C shares the following management directions with Alternative A (the Current Situation). Alternative C would:

- o maintain the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o permit oil and gas studies where compatible with refuge purposes; and
- o propose no additional areas for wilderness designation.

The major differences in management directions between Alternative C and Alternative A are that Alternative C would:

- o provide opportunities for commercial timber harvesting in designated areas in the refuge; and
- o provide opportunities for habitat improvements, including mechanical manipulation, if necessary in the future.

Environmental Consequences of Alternative C

Vegetation

- o Overall, negligible impact to the refuge's vegetation.
- o Major long-term adverse impacts to vegetation in localized areas from mining and minor adverse impacts from timber harvesting operations.

Fish and Wildlife

- o From a refuge-wide perspective, negligible impacts to waterfowl, shorebirds, marine mammals, moose, Dall sheep, muskox, black and brown bear, and furbearers; minor adverse impacts to fish, raptors, and caribou.

- o Moderate adverse impacts to raptors possible in localized areas from timber harvesting; major adverse impacts possible to fish in localized areas from mining.
- o No effect on most of the refuge's threatened and endangered species; minor to negligible adverse impacts to the threatened and endangered peregrine falcon subspecies from recreational use.

Water Quality and Quantity

- o Negligible overall impact to water quality and water quantity.
- o Minor adverse impacts to water quality possible in localized areas from increased public use and timber harvesting; major adverse impacts possible to water quality and quantity in localized areas from mining.

Air Quality

- o Negligible changes in air quality.

Ecosystems

- o Minor adverse impact overall on the refuge's ecosystems.
- o Mining would have a moderate adverse impact on ecosystems on a site-specific basis.

Population and Economy

- o Negligible overall change in the population of the local communities.
- o Negligible benefits to the local economy from mining and commercial timber harvest operations.

Subsistence

- o Minor localized adverse effect on subsistence resources and harvests; no significant restrictions on subsistence uses in the refuge.
- o Commercial timber harvesting on the Porcupine River has the potential to result in temporary minor adverse impacts to trapping.

Recreation

- o Negligible effect overall on recreation within the refuge.
- o Minor adverse impact on recreation in localized areas (i.e., Atigun Gorge, Hulahula and Kongakut drainages) due to increased public use.

Cultural Resources

- o Negligible effect on cultural resources with cultural resource inventories and the application of mitigation measures.

Environmental Consequences of the Wilderness Proposal (No new areas proposed)

Wilderness Values

- o Wilderness values would be maintained in over 99% of the refuge.
- o In a few localized areas (e.g., Atigun Gorge, Kongakut River, Hulahula River) increased public use could diminish wilderness values.
- o Commercial timber harvesting and mining could adversely affect refuge wilderness values in localized areas.

Oil and Gas Activities South of the "1002" Area

- o No effect on potential oil and gas activities; only oil and gas studies could be permitted, with restrictions in the Arctic Wilderness and wild river corridors.
- o Oil and gas leasing and development would continue to be prohibited unless Congress amends the Alaska Lands Act.

Mining Development

- o No effect; only 9 active claims exist on the refuge that could be developed.

Commercial Timber Harvesting

- o No effect; this use could be permitted in the moderate management areas (up to 29% of the refuge) if compatible with refuge purposes.

ALTERNATIVE D

Alternative D emphasizes protection of fish and wildlife populations and habitats. Disturbances to fish and wildlife habitats and populations would be minimized. Opportunities for hunting, fishing, trapping, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. Guiding and outfitting would be the primary permitted commercial use of the refuge south of and within the Brooks Range. The Service would manage public use on the refuge as it has in the past. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service also would recommend 5.2 million acres (about 46% of the non-wilderness lands in the refuge) be added to the Arctic Wilderness in this alternative.

Alternative D shares the following management directions with Alternative A (the Current Situation). Alternative D would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational activities;
- o permit guides and outfitters to operate in the refuge; and
- o permit oil and gas studies where compatible with refuge purposes.

The major difference between Alternative D and Alternative A is that Alternative D would:

- o propose most of the refuge lands in the Brooks Range west of the Canning River and the East Fork of the Chandalar River, covering 5.2 million acres (2.1 million ha), for wilderness designation.

Environmental Consequences of Alternative D

Vegetation

- o Overall, negligible impacts to the refuge's vegetation.
- o Major, long-term adverse impacts to vegetation in localized areas from mining.

Fish and Wildlife

- o From a refuge-wide perspective, negligible impacts to waterfowl, shorebirds, marine mammals, moose, Dall sheep, muskox, black and brown bear, and turbearers; minor adverse impacts to fish, and raptors.
- o Major adverse impacts to fish possible in localized areas from mining.
- o No effect on most of the refuge's threatened and endangered species; minor to negligible adverse impacts to the threatened and endangered peregrine falcon subspecies from recreational use.

Water Quality and Quantity

- o Negligible impact overall to water quality and water quantity.
- o Minor adverse impacts to water quality possible in localized areas from increased public use; major adverse impacts possible to water quality and quantity in localized areas from mining.

Air Quality

- o Negligible changes in air quality.

Ecosystems

- o Minor adverse impact overall on the refuge's ecosystems.
- o Mining would have a moderate adverse impact on ecosystems on a site-specific basis.

Population and Economy

- o Negligible overall change in the population of the local communities.
- o Negligible benefits for the local economy.

Subsistence

- o Negligible effect on subsistence resources and harvests; no significant restrictions on subsistence uses in the refuge.

Recreation

- o Negligible effect overall on recreation within the refuge.
- o Minor adverse impact on recreation in localized areas (e.g., Atigun Gorge, Hulanuta and Kongakut drainages) due to increased public use.

Cultural Resources

- o Negligible effect on cultural resources.

Environmental Consequences of the Wilderness Proposal (46% of the non-wilderness refuge lands proposed for wilderness designation)

Wilderness Values

- o Wilderness values would be maintained in over 99% of the refuge.

- o The proposal would help maintain wilderness values in a 5.2 million acre portion of the Brooks Range not already in the Arctic Wilderness.
- o In a few localized areas (e.g., Atigun Gorge, Kongakut River, Hulahula River) increased public use could diminish wilderness values.

Oil and Gas Activities South of the "1002" Area

- o No effect on potential oil and gas activities; only oil and gas studies could be permitted, with restrictions in the Arctic Wilderness and wild river corridors.
- o Oil and gas leasing and development would continue to be prohibited unless Congress amends the Alaska Lands Act.

Mining Development

- o No effect; only 9 active claims exist on the refuge (2 within the area proposed for wilderness) that could be developed.

Commercial Timber Harvesting

- o No effect; this use would be precluded as all of the federal lands in the refuge would be designated wilderness, minimal management, or wild river management areas.

ALTERNATIVE E

Alternative E is identical to Alternative D except for the size of the wilderness proposal. The alternative emphasizes protection of fish and wildlife populations and habitats. Disturbances to fish and wildlife habitats and populations would be minimized. Opportunities for hunting, fishing, trapping, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. Guiding and outfitting would be the primary permitted commercial use of the refuge south of the Brooks Range. The Service would manage public use on the refuge as it has in the past. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service also would recommend 8.1 million acres (72% of the non-wilderness refuge lands) be added to the existing Arctic Wilderness in this alternative.

Alternative E shares the following management directions with Alternative A (the Current Situation). Alternative E would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational activities;
- o permit guides and outfitters to operate in the refuge; and
- o permit oil and gas studies where compatible with refuge purposes.

The major difference between Alternative E and Alternative A is that Alternative E would:

- o propose most refuge lands west of the Canning River and the East Fork of the Chandalar River in the Brooks Range, and between the existing Arctic Wilderness and the Porcupine River for wilderness designation, covering a total of 8.1 million acres (3.4 million ha).

Environmental Consequences of Alternative E

Vegetation

- o Overall, negligible impacts to the refuge's vegetation.
- o Major, long-term adverse impacts to vegetation in localized areas from mining.

Fish and Wildlife

- o From a refuge-wide perspective, negligible impacts to waterfowl, shorebirds, marine mammals, moose, Dall sheep, muskox, black and brown bear, and furbearers; minor adverse impacts to fish and raptors.
- o Major adverse impacts to fish possible in localized areas from mining.
- o No effect on most of the refuge's threatened and endangered species; minor to negligible adverse impacts to the threatened and endangered peregrine falcon subspecies from recreational use.

Water Quality and Quantity

- o Negligible overall impact to water quality and water quantity.
- o Minor adverse impacts to water quality possible in localized areas from increased public use; major adverse impacts possible to water quality and quantity in localized areas from mining.

Air Quality

- o Negligible changes in air quality.

Ecosystems

- o Negligible impact overall on the refuge's ecosystems.
- o Mining would have a moderate adverse impact on ecosystems on a site-specific basis.

Population and Economy

- o Negligible overall change in the population of the local communities.
- o Negligible benefits to the local economy.

Subsistence

- o Negligible effect on subsistence resources and harvests; no significant restrictions on subsistence uses in the refuge.

Recreation

- o Negligible overall effect on recreation within the refuge.
- o Minor adverse impact on recreation in localized areas (i.e., Atigun Gorge, Hulahula and Kongakut drainages) due to increased public use.

Cultural Resources

- o Negligible effect on cultural resources.

Environmental Consequences of the Wilderness Proposal (72% of the non-wilderness refuge lands proposed for wilderness designation)

Wilderness Values

- o Wilderness values would be maintained in over 99% of the refuge.
- o The proposal would help maintain wilderness values in a 8.1 million acre area in the Brooks Range and Porcupine Plateau not already in the Arctic Wilderness.
- o In a few localized areas (e.g., Atigun Gorge, Kongakut River, Hulahula River) increased public use could diminish wilderness values.

Oil and Gas Activities South of the "1002" Area

- o No effect on potential oil and gas activities; only limited oil and gas studies could be permitted.
- o Oil and gas leasing and development would continue to be prohibited unless Congress amends the Alaska Lands Act.

Mining Development

- o No effect; only 9 active claims exist on the refuge (4 within the area proposed for wilderness) that could be developed.

Commercial Timber Harvesting

- o This use would be prohibited on most of the Porcupine Plateau, precluding the possibility of a commercial timber harvest in the Porcupine River drainage; some potential economic benefits consequently would be foregone.

ALTERNATIVE F

Alternative F is identical to Alternatives D and E except for the increased size of the wilderness proposal. Alternative F emphasizes protection of fish and wildlife populations and habitats. Disturbances to fish and wildlife habitats and populations would be minimized. Opportunities for hunting, fishing, trapping, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. Guiding and outfitting would be the primary permitted commercial use of the refuge south of the Brooks Range. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service would recommend 8.9 million acres (79% of the non-wilderness refuge lands) be added to the existing Arctic Wilderness in this alternative.

Alternative F shares the following management directions with Alternative A (the Current Situation). Alternative F would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;

- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational uses;
- o permit existing economic activities (such as guides and outfitters) to continue to operate in the refuge; and
- o permit limited oil and gas studies where compatible with refuge purposes.

The major difference between Alternative F and Alternative A is that Alternative F would:

- o propose most of the refuge lands south and west of the existing Arctic Wilderness (8.9 million acres or 3.6 million ha) for wilderness designation.

Environmental Consequences of Alternative F

Vegetation

- o Overall, negligible impacts to the refuge's vegetation.
- o Major adverse long-term impacts to vegetation in localized areas possible from mining.

Fish and Wildlife

- o From a refuge-wide perspective, negligible impacts to waterfowl, shorebirds, marine mammals, moose, Dall sheep, muskox, black and brown bear, and furbearers; minor adverse impacts to fish and raptors.
- o Major adverse impacts to fish possible in localized areas from mining.
- o Minor to negligible adverse impacts to the threatened and endangered peregrine falcon subspecies on the refuge from increased recreational use.

Water Quality and Quantity

- o Negligible overall impact to water quality and water quantity.
- o Minor adverse impacts to water quality possible in localized areas from increased public use; major adverse impacts possible to water quality and quantity in localized areas from mining.

Air Quality

- o Negligible changes in air quality.

Ecosystems

- o Negligible impact overall on the refuge's ecosystems.
- o Mining would have a moderate adverse impact on ecosystems on a site-specific basis.

Population and Economy

- o Negligible overall change in the population of the local communities.
- o Negligible benefits to the local economy.

Subsistence

- o Negligible effect on subsistence resources and harvests; no significant restrictions on subsistence uses in the refuge.

Recreation

- o Negligible effect overall on recreation within the refuge.
- o Minor adverse impact on recreation in localized areas (i.e., Atigun Gorge, Hulahula, Kongakut drainages) due to increased public use.

Cultural Resources

- o Negligible effect on cultural resources.

Environmental Consequences of the Wilderness Proposal (79% of the non-wilderness refuge lands proposed for wilderness designation)

Wilderness Values

- o Wilderness values would be maintained in over 99% of the refuge.
- o The proposal would help maintain wilderness values in a 8.9-million acre area in the Brooks Range and Porcupine Plateau not already in the Arctic Wilderness.
- o In a few localized areas (e.g., Atigun Gorge, Kongakut River, Hulahula River) increased public use could diminish wilderness values.

Oil and Gas Activities South of the "1002" Area

- o No effect on potential oil and gas activities; only limited oil and gas studies could be permitted.
- o Oil and gas leasing and development would continue to be prohibited unless Congress amends the Alaska Lands Act.

Mining Development

- o The wilderness proposal would have a negligible effect on mineral development within the refuge; only 4 active claims exist within the area proposed for wilderness that could be developed.

Commercial Timber Harvesting

- o This use would be prohibited on the Porcupine Plateau, precluding the possibility of a commercial timber harvest in the Porcupine River drainage; some potential economic benefits consequently would be foregone.

ALTERNATIVE G

This alternative was developed in response to an alternative proposed by the Northern Alaska Environmental Center and other conservation groups during the planning process. Alternative G is intended to maximize protection to the refuge's wilderness qualities, maximize protection of the refuge's fish and wildlife populations and habitats in their natural diversity, and maintain high quality opportunities for hunting, fishing, trapping, and nonconsumptive recreational activities. The alternative emphasizes visitor self-reliance, independence, freedom and challenge, and minimizes government involvement in the experience. Reasonable access would be provided, but limits would be placed on mechanized access into the refuge. Development of facilities and economic uses would be highly restricted.

Under Alternative G the Service would propose all the refuge lands outside of the existing Arctic Wilderness for wilderness designation, with the exception of the "1002" area. The alternative would place an additional layer of protection on refuge lands to address existing and potential threats that face the refuge's wilderness qualities. Several of the provisions are not consistent with the Alaska Lands Act--congressional action would be required to fully implement this alternative. Consequently, all of the major actions proposed in this alternative would be included in the wilderness proposal sent to Congress.

Alternative G shares the following management directions with Alternative A (the Current Situation). Alternative G would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o provide for continued subsistence use of refuge resources using motorboats, snowmobiles, and other means of surface transportation traditionally employed for such purposes by local residents;

The following management directions indicate the major differences in Alternative G from Alternative A. Alternative G would:

- o propose all of the non-wilderness federal lands south of the "1002" coastal plain area for wilderness designation;
- o prohibit the construction of any permanent administrative, research or recreational facilities, and require the removal of several existing structures within the refuge;
- o limit mechanized activities and access by both administrative agencies and the public in the refuge; aircraft landings would be restricted in the Firth River-Mancha Creek Research Natural Area;
- o make acquisition of inholdings from willing sellers in the refuge a high priority, with a portion of the refuge's annual funding dedicated to this purpose;
- o prohibit oil and gas studies in the refuge (except for studies mandated under Section 1010 of the Alaska Lands Act);
- o prohibit development of new recreational facilities and other "improvements" in the refuge;
- o prohibit habitat improvements or manipulation of fish and wildlife populations, including predator control and fishery management activities and facilities;
- o if necessary limit the size and number of guided and unguided recreational groups using popular areas in the refuge; and
- o limit interpretative activities in the refuge.

Environmental Consequences of Alternative G^{a/}

Vegetation

- o Overall, negligible impacts to the refuge's vegetation.

^{a/}The assessment of Alternative G assumes valid mining claims would remain undeveloped.

Fish and Wildlife

- o From a refuge-wide perspective, negligible impacts to fish and wildlife; minor adverse impact to raptors possible in localized areas with an increase in public use.
- o Minor to negligible adverse impacts to the threatened and endangered peregrine falcon subspecies on the refuge from increased recreational use.

Water Quality and Quantity

- o Negligible impact overall to water quality and water quantity.
- o Minor adverse impacts to water quality possible in localized areas if public use increases.

Air Quality

- o Negligible changes in air quality.

Ecosystems

- o Negligible impact on the refuge's ecosystems.

Population and Economy

- o Negligible overall change in the population of the local communities.
- o Negligible benefits to the local economy.

Subsistence

- o Negligible effect on subsistence resources and harvests; no significant restrictions on subsistence uses or the means of access in the refuge.

Recreation

- o Negligible effect overall on recreation within the refuge.
- o The level of recreational use in localized areas may be reduced, which could both decrease the potential for perceived overcrowding and recreational conflicts, and displace recreational users to other areas in the refuge.
- o Aircraft access would be restricted in the Mancha Creek-Firth River area, which would both limit the freedom of visitors to land aircraft in this area and assure a high quality wilderness recreational experience.

Cultural Resources

- o Negligible effect on cultural resources.

Environmental Consequences of the Wilderness Proposal (86% of the non-wilderness refuge lands proposed for wilderness designation)

Refuge Management

- o The special provisions of the wilderness proposal would have a minor effect on refuge management; management flexibility of the agency could be limited in certain areas in the future.

Wilderness Values

- o The proposal would help maintain wilderness values in a 9.7 million acre area in the Brooks Range and Porcupine Plateau not already in the Arctic Wilderness, as well as the rest of the refuge.

Oil and Gas Activities South of the "1002" Area

- o Only surface geologic studies could be permitted; oil and gas studies generally would be precluded.
- o Oil and gas leasing and development would continue to be prohibited unless Congress amends the Alaska Lands Act.

Mining Development

- o The wilderness proposal would have a negligible effect on mineral development within the refuge; only 9 active claims exist within the area proposed for wilderness that could be developed.

Commercial Timber Harvesting

- o This use would be prohibited on the Porcupine Plateau, precluding the possibility of a commercial timber harvest in the Porcupine River drainage; some potential economic benefits consequently would be foregone.

SECTION 810(a) EVALUATION

The Service has determined in its Section 810(a) evaluation that Alternative A, the preferred alternative, would not significantly restrict subsistence uses in Arctic Refuge--opportunities for subsistence would be maintained. Any impacts that occur to fish and wildlife resources in this alternative would be localized, and would not significantly affect subsistence activities. Increased numbers of sport hunters in this alternative would harvest more game in the refuge than in 1987, but sufficient fish and wildlife should be available for local residents to satisfy their needs. The Service would work with the Native corporations, the Alaska Department of Fish and Game, and the State Boards of Fisheries and Game to ensure that opportunities for subsistence harvests are maintained in this alternative.

With the possible exception of Alternative B, none of the alternatives the Service proposed for the Arctic Refuge would significantly affect the availability of important subsistence fish and wildlife populations or significantly restrict subsistence uses. The oil development in Alternative B could significantly restrict subsistence activities of some Arctic Village and Venetie residents.

SELECTION OF THE PREFERRED ALTERNATIVE

The Service has selected Alternative A as its preferred alternative for managing Arctic Refuge on the basis that it would both satisfy the purposes of the refuge, and provide a balanced approach to meeting the needs and concerns of the public. The alternative would maintain management options for the non-wilderness portion of the refuge. The Service would carefully monitor and regulate all uses and activities within the refuge to ensure that adverse impacts to refuge resources and users are minimized.

The Service will not begin to implement the management directions in the preferred alternative until a 45-day waiting period following the publication of the final refuge comprehensive conservation plan/environmental impact statement has elapsed and a record of decision has been published.

IMPLEMENTATION AND REVISION OF THE COMPREHENSIVE CONSERVATION PLAN

Implementation of the proposed actions in this plan will depend upon the availability of funds and personnel, and upon the coordination of many governmental activities. These factors will determine the extent of development, management and maintenance the refuge receives in any given year.

The Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement provides broad policy guidance for managing Arctic Refuge over the next 10 to 15 years. It should be viewed as a dynamic document that will need to be reviewed and updated periodically. Every three to five years the Service will review public comments, local and state government

recommendations, staff recommendations, and research studies, among other sources, to determine if revisions to the plan are necessary. If major changes are proposed, public meetings may be held, or new environmental assessments/environmental impact statements may be necessary. Full review and updating of the plan will occur every 10 to 15 years, more often if necessary.

If and when Congress takes action on the management of the "1002" area the Service will revise the refuge comprehensive conservation plan to incorporate congressional directives. Management of the "1002" area may have a significant bearing on management of the rest of the refuge (e.g., on the need for transportation and utility corridors, air and water quality, fish and wildlife management). If necessary, major revisions outside the "1002" area will be made in the plan following the National Environmental Policy Act process.

Following adoption of the plan, the Service will, as necessary, undertake detailed "management planning" to guide implementation of the plan and operation of the refuge. In accordance with Service policy, detailed management plans will be prepared to address specific resource and public use management activities such as wilderness, fisheries, fire, habitat, and recreation management.

I. INTRODUCTION

I. INTRODUCTION

PURPOSE AND NEED FOR ACTION

The purpose of this planning action is to develop a comprehensive conservation plan (the plan) for the Arctic National Wildlife Refuge, Alaska. This congressionally mandated plan serves as a refuge "master" plan, providing broad policy guidance and establishing the long-term goals and objectives for Fish and Wildlife Service management of the refuge. It also is a means of informing interested parties how the lands and resources in the refuge will be managed over the next 10 to 15 years. The plan should be viewed as a dynamic document that will need to be reviewed and updated periodically. Supplemental management plans will be prepared in the future to specifically address the management of rivers, fish and wildlife, and other topics.

This document incorporates a draft environmental impact statement (EIS). It describes seven alternative plans for managing Arctic Refuge. The document includes a description of the existing environment on the refuge and an assessment of the effects of implementing these alternatives. Each alternative provides differing choices for addressing internal management concerns and for resolving public issues. After public review, the Service will evaluate comments on this draft environmental impact statement, make revisions as necessary, and publish a final environmental impact statement.

Federal statute requires preparation of a plan to guide management of Arctic National Wildlife Refuge. Section 304(g) of the Alaska National Interest Lands Conservation Act of 1980 (the Alaska Lands Act; PL 96-487) directs the Secretary of the Interior to prepare, and from time to time, revise, a "... comprehensive conservation plan ... for each refuge (in Alaska)...."

This document also serves as the wilderness review for the Arctic Refuge south of the "1002" area and the existing Arctic Wilderness. Section 1317 of the Alaska Lands Act directs the Secretary to review all non-wilderness lands in the refuge as to their suitability for inclusion in the National Wilderness Preservation System, and report his findings to the President. The document identifies lands that would be suitable for wilderness designation. Each alternative includes a wilderness recommendation based on this evaluation and the management directions of the alternative.

In addition to the above requirements, a comprehensive conservation plan is needed to:

- o ensure that national policy direction is incorporated in the management of the refuge;
- o provide a systematic process for making and documenting refuge decisions;
- o establish broad management strategies for refuge management programs and activities;
- o provide continuity in the management of the refuge;
- o provide a basis for budget requests; and
- o provide a basis for evaluating accomplishments.

OVERVIEW OF THE REFUGE

Alaska's arctic region has generated interest and concerns for Americans since the early 1900s. Robert Marshall, a nationally known Alaska explorer and conservationist, first pleaded that much of northern Alaska should be set aside and protected. The federal government was interested in the arctic in part because of its oil potential. On January 22, 1943, the Department of Interior issued Public Land Order (PLO) 82, which withdrew more than 98 million acres (40 million ha) in northern and southeastern Alaska. All of the lands north of the crest of the Brooks Range between Cape Lisburne and Canada were closed to all forms of appropriation under the public lands laws, including the mining and mineral leasing laws. The order was issued to assist the war effort, ensuring that federal oil and gas exploratory activities undertaken in the state could proceed without complications.

In 1949, while the Navy was searching for oil and gas, the National Park Service began a survey of Alaska's recreational potential. In 1954, after surveying the eastern Brooks Range, George L. Collins and Lowell Sumner of the National Park Service recommended that the northeast corner of Alaska be preserved for its wildlife, wilderness, recreational, scientific and cultural values. They further recommended that the area be an international park, to include contiguous lands between the Alaska-Canada border and the MacKenzie Delta. Nationally prominent conservationists, including A. Starker Leopold, Olaus Murie, and Howard Zahniser, supported this idea and began to work to establish an arctic wilderness reserve in northeastern Alaska.

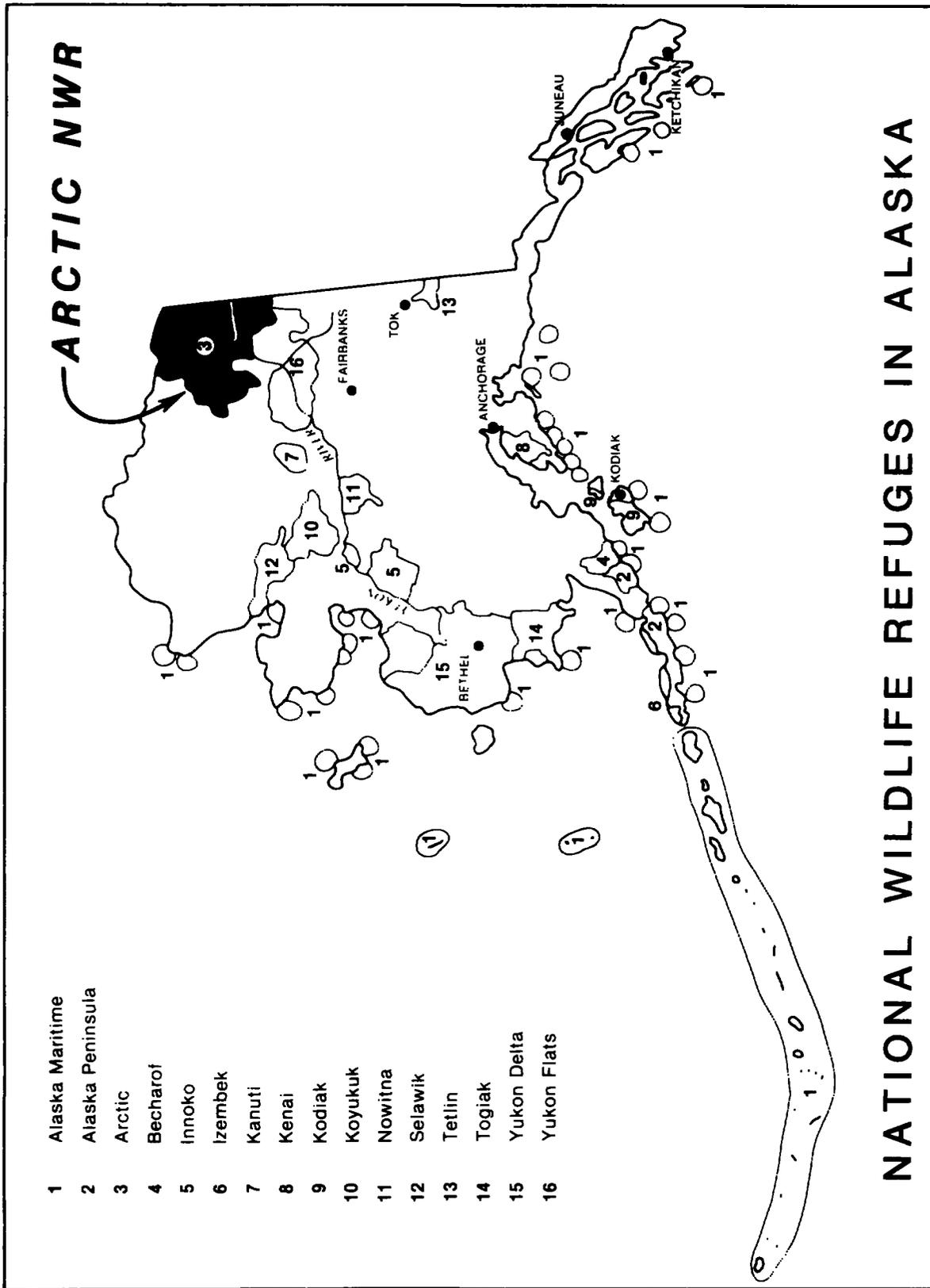
During the next seven years there ensued a political struggle over the future of the area.^{a/} While there was considerable support for protecting the area, there was strong opposition to the arctic wilderness proposal from those concerned with future industrial development in the territory. The oil industry and those branches of government responsible for energy development already recognized the oil and gas potential of the area. Among conservationists and federal representatives there was some disagreement over which agency should manage the land. It was ultimately agreed that Fish and Wildlife Service management should be sought.

On December 9, 1960, Secretary of the Interior Fred A. Seaton signed two public land orders. Public Land Order 2214 set aside 8.9 million acres (3.6 million ha) as the Arctic National Wildlife Range, and withdrew the area from all forms of appropriation under the public land laws, including the mining but not the mineral leasing laws. The second order, Public Land Order 2215, revoked Public Land Order 82 of 1943. The Arctic National Wildlife Range thus became a part of the National Wildlife Refuge System, managed by the U.S. Fish and Wildlife Service. The refuge system includes over 430 units in 49 states, with 16 refuges in Alaska (Figure 1).

In 1971, Congress enacted the Alaska Native Claims Settlement Act (ANCSA; 88 Stat. 688). Under the provisions of this statute, the Secretary of Interior proposed 3.7 million acres (1.5 million ha) be added to the existing

^{a/}For a detailed history of the establishment of the original refuge, see Spencer, Naske and Carnahan, 1979, National wildlife refuges of Alaska. A historical perspective. Part I.

Figure 1. National wildlife refuges in Alaska.



Arctic National Wildlife Range. The proposal included all navigable waters, as well as a 3-mile wide (5-km) strip lying off the coastline of the existing wildlife range. (This proposal was incorporated into the Section 204(c) withdrawals noted below.) Under Section 14(a) of the Alaska Native Claims Settlement Act (and Section 1431(g) of the Alaska Lands Act), the Kaktovik Inupiat Corporation was given entitlement to the surface estate of about 92,000 acres (37,000 ha) in the refuge. The subsurface estate for the area was subsequently conveyed to the Arctic Slope Regional Corporation (ASRC) in 1983, 1984 and 1986 pursuant to a land exchange agreement.

On November 16, 1978, the Secretary of Interior invoked his emergency withdrawal powers under Section 204(e) of the Federal Land Policy Management Act (FLPMA; 90 Stat. 2743) and withdrew approximately 110 million acres (45 million ha) throughout Alaska. These lands were withdrawn, subject to valid existing rights, for three years from settlement, location, entry, and selection under the public land laws. The intent of this withdrawal was to protect Congress' options for national interest lands legislation.

Fifteen months later, in February 1980, the Secretary of Interior withdrew approximately 37.6 million acres (15.2 million ha) throughout Alaska as national wildlife refuges under Section 204(c) of the Federal Land Policy Management Act. Approximately 9.5 million acres (3.8 million ha) of this withdrawal was to be added to the Arctic National Wildlife Refuge.

In December 1980, Congress enacted the Alaska National Interest Lands Conservation Act (Alaska Lands Act; 94 Stat. 2371). This act, among other things, redesignated the original 8.9 million-acre (3.6-million ha) Arctic National Wildlife Range as the Arctic National Wildlife Refuge. All the lands, waters, interests and whatever submerged lands, if any, that were retained in federal ownership at the time of statehood were included in the refuge. The Alaska Lands Act added to the original refuge about 9.1 million acres (3.7 million ha) of adjoining public lands west to the Trans-Alaska Pipeline and south to the Yukon Flats National Wildlife Refuge. The Sheenjek, Wind and Ivishak rivers were designated as wild rivers. An area of about 8 million acres (3 million ha), comprising most of the original refuge, was designated as wilderness, while about 1.5 million acres (607,000 ha) on the arctic coastal plain was opened under Section 1002 to a limited surface exploration program for oil and gas. Leasing, development and production of oil and gas in the refuge were prohibited under Section 1003--these activities will require further congressional action before they can occur.

About 1.3 million acres (526,000 ha) selected by the State of Alaska in the southeast corner of the refuge, surrounded on three sides by refuge lands, was not included in the expansion under the Alaska Lands Act. On September 29, 1983, the State relinquished the area under Section 906(f)(2) of the Alaska Lands Act. On October 20, 1983, the Secretary of Interior accepted the State's relinquishment of 971,000 acres (393,000 ha) and proclaimed them part of the Arctic Refuge pursuant to Section 1302(i) of the Alaska Lands Act. The other 325,000 acres (132,000 ha) were determined by the Bureau of Land Management (BLM) to be an invalid selection and were not eligible for addition to the refuge under this section.

The Arctic Refuge encompasses about 19.6 million acres (7.9 million ha) of land in northeastern Alaska--an area almost as large as all of New England. The refuge is bordered on the west by the Trans-Alaska pipeline corridor, on the south by Venetie-Arctic Village lands and Yukon Flats National Wildlife Refuge, on the east by Canada, and on the north by the Beaufort Sea (Figure 2). Fairbanks, the largest city near the refuge, is about 180 air miles (290 km) south of the refuge boundary. Two villages, Kaktovik on Barter Island and Arctic Village on the south slope of the Brooks Range, are located immediately adjacent to the refuge.

The Arctic Refuge is the most northerly unit, and the second largest, in the National Wildlife Refuge System. The refuge is the only area where people may practicably travel on foot or by boat and traverse a full range of boreal forest, mountain, and north slope landscapes and habitats because of the close proximity of the arctic coast and mountains. The four tallest peaks in the Brooks Range, and the largest number of glaciers, occur here. The northern slope descends to the Beaufort Sea and a series of barrier islands and lagoons on the coast. The valley slopes are dotted with lakes, sloughs and wetlands. Groves of stunted black spruce grade into tall dense spruce forests in the Porcupine River area in the southeastern portion of the refuge.

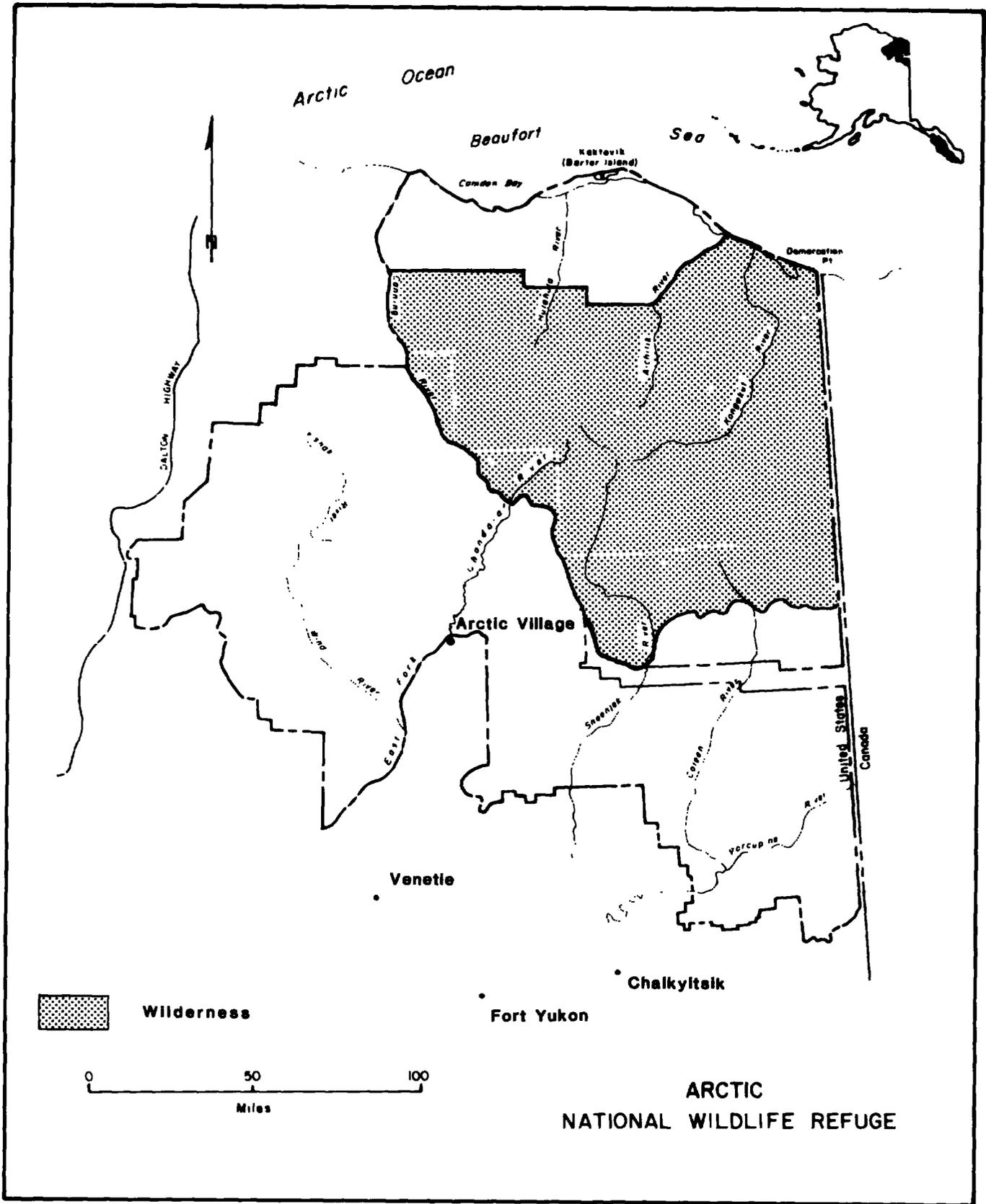
The refuge includes fish and wildlife species common to arctic and subarctic Alaska. Portions of the key calving ground for the Porcupine caribou herd, one of the largest in Alaska, and critical habitat for the endangered peregrine falcon are found here. Polar bear den on refuge land. Other wildlife species found in the refuge include snow goose, tundra swan, golden eagle, snowy owl, gyrfalcon, muskox (reintroduced into the refuge), Dall sheep, brown and black bear, wolf, wolverine, arctic fox, lynx, marten, snowshoe hare, and moose. Arctic grayling, lake trout, arctic char, chum, chinook, coho and pink salmon, whitefish, northern pike, burbot and arctic cod are found in the area's waters. The waters offshore of the refuge harbor summering bowhead whales, and the coastal lagoons provide year-round habitat for polar bear and ringed and bearded seals.

PURPOSES OF THE ARCTIC REFUGE

Section 303(2)(B) of the Alaska Lands Act sets forth the following major purposes for which the Arctic National Wildlife Refuge was established and shall be managed:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including the participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;
- (ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

Figure 2. Location of the Arctic Refuge.



(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

LEGAL CONTEXT

The Service manages national wildlife refuges pursuant to various legal and administrative requirements. The principal treaties and federal statutes that affect planning for and management of Arctic Refuge are briefly discussed below. Regulations that implement these laws are found in Title 50 of the U.S. Code of Federal Regulations (50 CFR).

Treaties

Several international treaties affect how the Service manages Arctic Refuge. Among these are treaties with Canada, Denmark, Mexico, Norway, Japan and the USSR, and the Convention on Nature Protection and Wildlife Conservation in the Western Hemisphere. These treaties are summarized in Appendix J. The treaties differ in emphasis and species of primary concern but collectively provide guidelines for identifying and protecting important habitats and ecosystems, and protecting and managing individual species.

Treaties for migratory bird protection include management provisions such as: (1) prohibiting disturbance of nesting colonies; (2) allowing the establishment of seasons for the taking of birds and collection of their eggs by "indigenous inhabitants" of Alaska for their own nutritional and other essential needs; (3) directing each nation to undertake, to the maximum extent possible, measures necessary to protect and enhance migratory bird environments and prevent and abate pollution or detrimental alteration of their habitats; (4) requiring each nation to provide immediate notification to the others when pollution or destruction of habitats occurs or is expected; (5) stipulating that each nation shall, to the extent possible, establish preserves, refuges, protected areas, and facilities for migratory birds and their habitats and manage them to preserve and restore natural ecosystems; and (6) providing that protective measures under the treaty may be applied to species and subspecies not listed in the specific convention, but which belong to one of the families containing listed species. Of the migratory bird species of concern in the treaties, those that use Arctic Refuge include loons, swans, geese, ducks, hawks, eagles, harriers, ospreys, falcons, cranes, plovers, sandpipers, jaegers, gulls, terns, owls, and passerines.

Free passage of salmon and other migratory fish species that spawn in Canadian waters is provided for on the Porcupine River under the Treaty of Washington.

The polar bear treaty recognizes the responsibilities of the circumpolar countries for coordination of actions to protect polar bear. The treaty commits the nations to manage polar bear populations in accordance with sound conservation practices; prohibits hunting, killing, and capturing polar bear except for limited purposes and by limited methods; and commits all the parties to protect the ecosystems of polar bear, especially denning and feeding areas and migration corridors.

International Agreements

On July 17, 1987 an international agreement for management of the Porcupine caribou herd was signed between the governments of the United States and Canada. The State of Alaska, Canadian Territorial governments, and local users also participated in the development of this agreement. The purpose of the agreement is to facilitate U.S./Canadian cooperation and coordination of programs and activities aimed at long-term conservation of the Porcupine caribou herd. The agreement will ensure that the Porcupine herd, its habitat, and interests of users of the herd are given effective consideration in evaluating proposed activities within the range of the herd. All activities having a potential impact on the conservation of the Porcupine caribou herd or its habitat will be subject to impact assessment and review and may require mitigation under the agreement.

The agreement establishes an eight-member international Porcupine Caribou Board, made up of four members from each country, to make recommendations and provide advice on those aspects of conservation of the Porcupine caribou herd that require international coordination. The Board will serve as a means of exchanging information on and facilitating cooperative planning for the herd through its range.

Federal Legislation

National Wildlife Refuge System Administration Act of 1966

This act provides general guidelines and directives for administering and managing all areas in the National Wildlife Refuge system, and further provides that the system be administered by the Secretary of Interior through the Fish and Wildlife Service. It defines key terms, establishes criteria for opening refuges to migratory bird hunting, and procedures for divestiture of lands. The law also establishes the general standard of "compatibility," requiring that uses of refuge lands must be determined to be compatible with the purposes for which individual refuges were established.

Alaska Native Claims Settlement Act of 1971 (Native Claims Act)

The purpose of this act was to provide for "a fair and just settlement of all claims by Natives and Native groups of Alaska, based on aboriginal land claims." The law provided for grants of land and money and the establishment of Native corporations to maintain the economic affairs of Native organizations. Under Section 14(a) the Kaktovik Inupiat Corporation was conveyed the surface estate, with several stipulations, to about 69,000 acres (28,000 ha) along the arctic coast. These lands lie north of and are surrounded by the "1002" area. Under Section 22(g), however, refuge lands conveyed to the village corporations remain subject to the laws and regulations governing use and development of the refuge. Section 17(b) of the Act provided for public easements across Native lands for access to federal lands.

Alaska National Interest Lands Conservation Act of 1980 (Alaska Lands Act)

In addition to amending the Alaska Native Claims Settlement Act and the Alaska Statehood Act, the Alaska Lands Act expanded the federal conservation system throughout the state (including refuges, parks, forests, wilderness areas, and wild and scenic rivers). With respect to national wildlife refuges, the Alaska Lands Act sets forth the purposes of the refuges, defines objectives and provisions for planning and management, and authorizes studies and programs related to wildlife and wildland resources, commodity resources, and recreational and economic uses (such as oil and gas exploration and development, subsistence opportunities, access, and transportation and utility systems). Section 1002 of the Act required an assessment of the resources of the coastal plain of the Arctic Refuge. Specifically, Section 1002(c) required a comprehensive baseline study of the fish, wildlife and habitat resources of the coastal plain. Section 1002(d)-(g) required the development, implementation and administration of an oil and gas exploration program. Section 1002(h) required the Secretary of Interior to submit a report to Congress on the oil and gas potential of the coastal plain, the impacts of development, and recommendations on whether or not further exploration and development should be authorized. This report was submitted to Congress on June 1, 1987.

Wilderness Act of 1964

This act established the National Wilderness Preservation System and prescribed policy for wilderness management. In 1980, Congress designated about 42% of the Arctic Refuge (8 million acres or 3.2 million ha) as wilderness in Section 702(3) of the Alaska Lands Act.

Wild and Scenic Rivers Act of 1968

This act established the National Wild and Scenic Rivers System, classifying rivers as either wild, scenic or recreational. It authorized the Secretary of Interior to study areas and submit proposals to the President and the Congress for addition to the system. The statute states that the rivers shall be administered in such a manner as to protect and enhance their values; water resource projects are restricted. Under the Alaska Lands Act the minerals in lands within one-half mile (0.8 km) of the designated river banks (subject to valid existing rights), are withdrawn from any form of appropriation under the mining laws and the mineral leasing laws. Section 602 of the Alaska Lands Act designated the Ivishak, upper Sheenjek, and Wind rivers as national wild rivers. This document defines the river corridors and provides management directions for lands within the corridors.

National Environmental Policy Act of 1969 (NEPA)

This act requires that federal agencies carefully analyze impacts prior to taking major federal actions that may significantly affect the quality of the human environment. A range of alternatives exists for managing the Arctic Refuge, some of which would meet this criterion. This planning process, therefore, is subject to the Act's requirements.

Endangered Species Act of 1973, as amended

This act provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action. The act, among other provisions, authorizes the determination and listing of endangered and threatened species and the habitat critical to those species; prohibits unauthorized taking, possession, sale, transport, etc., of endangered species; and provides authority to acquire lands for the conservation of listed species. Section 7 of the act requires federal agencies to ensure that any action authorized, funded, or carried out by them does not jeopardize the continued existence of listed species or modify their critical habitat.

Antiquities Act, Archeological Resources Protection Act, the National Historic Preservation Act of 1966, as amended, and the American Indian Religious Freedom Act

These laws make reference to cultural resources or govern management of cultural resources on federal lands. The various historic preservation laws generally do the following: (1) vest ownership of historic and prehistoric properties and of materials collected from such sites with the state and federal governments; (2) protect archeological and historic sites from unauthorized disturbance and prescribe penalties for individuals who damage (or collect from) such sites; (3) mandate the inventory and evaluation of all sites on government owned and managed lands; (4) require that all projects with state or federal involvement be conducted in such a way as to protect any significant cultural resources that may be present (which includes, but is not limited, to conducting archeological surveys, site evaluations, and, if necessary, mitigation of adverse impacts on such resources); and (5) protect and preserve the rights of American Indians (including Eskimos and Aleuts) to believe, express and practice their traditional religion.

THE ARCTIC REFUGE PLANNING PROCESS

Legal and Administrative Planning Requirements

Section 304(g) of the Alaska Lands Act sets forth standards to be achieved in the development of comprehensive conservation plans for national wildlife refuges in Alaska. Specifically, prior to developing a plan for any refuge, the Secretary of the Interior is required to identify and describe:

- (A) the populations and habitats of the fish and wildlife resources of the refuge;
- (B) the special values of the refuge, as well as any other archeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness value of the refuge;
- (C) areas within the refuge that are suitable for use as administrative sites or visitor facilities, or for visitor services, as provided for in sections 1305 and 1306 of this Act;
- (D) present and potential requirements for access with respect to the refuge, as provided for in Title XI; and

(E) significant problems which may adversely affect the populations and habitats of fish and wildlife identified and described under subparagraph (A).

Additionally, each plan shall:

(A)... based upon the identifications and the descriptions required ...
[as noted above]-

(i) designate areas within the refuge according to their respective resources and values;

(ii) specify the programs for conserving fish and wildlife and the programs relating to maintaining the values referred to in paragraph (2)(B), proposed to be implemented with such areas; and

(iii) specify the uses within each such area which may be compatible with the major purposes of the refuge; and

(B) set forth those opportunities which will be provided within the refuge for fish and wildlife-oriented recreation, ecological research, environmental education and interpretation of refuge resources and values, if such recreation, research, education, and interpretation is compatible with the purposes of the refuge.

In preparing the plans the Secretary is required to ensure adequate interagency coordination and public participation. Specifically, interested and affected parties such as state agencies, Native corporations, and residents of local villages and political subdivisions must be provided opportunities to present their views. Further, prior to adopting a plan the Secretary is required to issue notice of its availability in the Federal Register, make copies available in regional offices of the Fish and Wildlife Service throughout the U.S., and provide opportunity for public review and comment.

Finally, Section 1317 of the Alaska Lands Act requires the Secretary to conduct a wilderness review, consistent with provisions of the Wilderness Act, of all refuge lands in Alaska not already designated as wilderness. Based on this review and public comment, the Secretary is to forward recommendations to the President, who in turn makes recommendations to the Congress regarding any lands considered suitable for addition to the National Wilderness Preservation System.

The Planning Process

The planning process used to develop the comprehensive conservation plan for Arctic Refuge was designed to fulfill the legal mandates cited above as well as the administrative requirements pertaining to all units of the National Wildlife Refuge System. Each plan alternative was developed to represent a long-range strategy and a broad framework for management and use of refuge resources. The foundation upon which the alternatives were developed and evaluated was provided by the refuge's resources and values, by the purposes of the refuge set forth in the Alaska Lands Act, by other laws and regulations governing administration and management of the refuge system, and by the

missions of the Fish and Wildlife Service and the National Wildlife Refuge System. The mission of the Service is to "provide the federal leadership to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of people." The mission of the refuge system is "to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available." Figure 3 shows the major steps of the process used in developing this plan.

Wilderness Review of the 1002 Area

As explained in the NOTICE TO THE READER, the "1002" area is not included in the wilderness review analysis in this document.^{a/} Management of this area as wilderness can not be considered until Congress acts and selects one of the five management alternatives analyzed in the 1002(h) report and the accompanying legislative environmental impact statement. In the event Congress selects Alternative D, the "no action" alternative in the 1002(h) report, the area will be examined for wilderness suitability and the necessary environmental documentation will be prepared. Under the other alternatives, future consideration of the "1002" area as wilderness is not a factor.

IMPLEMENTATION AND REVISION OF THE COMPREHENSIVE CONSERVATION PLAN

Implementation of the proposed actions in this plan will depend upon the availability of funds and personnel, and upon the coordination of many governmental activities. These factors will determine the extent of development, management and maintenance the refuge receives in any given year.

In implementing the plan the Service periodically will need to prepare site-specific evaluations to determine whether various proposed activities or uses are compatible with refuge purposes (unless Congress exempts the use from the compatibility requirement). All compatibility determinations will be reviewed by the regional office to ensure that the findings are consistent with the Service's regional policies. A record of the compatibility determinations will be kept on file and will be used as precedents for future decisions on refuge uses.

Following adoption of the plan, the Service will, as necessary, undertake detailed "management planning" to guide implementation of the plan and operation of the refuge. In accordance with Service policy, detailed management plans will be prepared to address specific resource and public use management activities such as wilderness, fisheries, habitat, and recreation management.

If and when Congress takes action on the management of the "1002" area the Service will revise the refuge comprehensive conservation plan to incorporate congressional directives. Management of the "1002" area may have a

^{a/} An analysis of the wilderness suitability of the "1002" area can be found on pages 478-483 in the Arctic National Wildlife Refuge coastal plain resource assessment. Final report. Baseline study of the fish, wildlife, and their habitats. Vol. II (Garner and Reynolds, 1986).

Figure 3. The refuge comprehensive conservation planning process.

Step 1--PREPLANNING

- o Identify laws, regulations, and policies affecting refuge management
- o Develop analysis methods and capabilities
- o Prepare public involvement plan
- o Hold public scoping meetings
- o Identify management issues and concerns

Step 2--INVENTORY AND ANALYSIS

- o Identify and compile resource information needed for planning
- o Describe the physical, biological, economic, and social environments
- o Establish data base
- o Determine capability of resources to respond to issues and concerns

Step 3--FORMULATE MANAGEMENT ALTERNATIVES

- o Develop management categories with specific management strategies and allowed uses
- o Apply management categories to "homogeneous" areas of the refuge
- o Develop refuge-wide management alternatives using various mixes of management categories
- o Determine management emphases of each alternative

Step 4--EVALUATION OF ALTERNATIVES

- o Evaluate the effects of implementing each alternative on the physical, biological, and human environments
- o Evaluate the ability of each alternative to achieve refuge purposes and resolve issues and concerns
- o Identify changes from baseline resource information

Step 5--PLAN SELECTION

- o Select a preferred alternative
- o Prepare and distribute a draft plan describing the alternatives and their expected effects if implemented
- o Provide opportunities for public review and comment

Step 6--SELECT COMPREHENSIVE CONSERVATION PLAN

- o Review and evaluate public comments received on the draft plan
- o Prepare and distribute a final plan that responds to public comments
- o Publish a Record of Decision no sooner than 45 days following publication of the final plan

Step 7--PLAN IMPLEMENTATION

- o With appropriate state and public involvement, prepare a detailed management plan(s) identifying specific actions necessary to implement the comprehensive conservation plan and achieve its goals and objectives
- o Begin implementing the plan

Step 8--PERIODIC UPDATING OF THE COMPREHENSIVE CONSERVATION PLAN

- o Every three to five years solicit public comments
 - o Review all local, state and federal recommendations, scientific data, and other information to update the plan as needed
 - o Make minor changes as an appendix to the plan after appropriate public review and approval by the regional director, with notification to the affected agencies and individuals
 - o Make major changes by going through the refuge comprehensive conservation planning process
-

significant bearing on management of the rest of the refuge (e.g., on the need for transportation and utility corridors, air and water quality, fish and wildlife management). If necessary, major revisions outside the "1002" area will be made in the plan following the National Environmental Policy Act process (see below).

As knowledge of the refuge's resources and users improves, other changes in the plan's management directions may be required. The refuge's fish and wildlife populations, user groups, adjacent land uses and other management considerations change with time--often in unforeseen ways. Problems also may be encountered in trying to implement the plan.

Consequently, the Service will periodically review and revise portions of the plan. Most of the resulting changes will "fine-tune" the plan. These changes will not require modification of this document--minor changes will be addressed in the more detailed refuge management plans and annual work plan advices. Only if a significant change is required in the management of the refuge will it become necessary to change the plan. For example, a revision of the plan would become necessary if a change is proposed in management that would cause major biological or socioeconomic impacts, or that would result in significant controversy (as evidenced by a substantial dispute regarding the size, nature, or effect of a major federal action).

To enable refuge users, adjacent landowners, local, state and federal agencies, and other interested parties to express their views on how the refuge is being managed, the Service will periodically hold meetings, or use other techniques such as comment cards and surveys, to solicit comments for evaluation purposes. By encouraging continuing public input in the management of the refuge the Service will be better able to serve the public, to determine potential problems before they occur, and to take immediate action to resolve existing problems.

Every three to five years the Service will review staff recommendations, public comments, local and state government recommendations, and research studies, among other sources, to determine if revisions to the plan are necessary. Minor revisions to the plan will be attached as appendices to the plan after appropriate public review and approval by the Service's regional director, with any affected and/or interested parties notified of proposed changes prior to their approval and implementation. If a major change is proposed in the management of the refuge, such as changing management of an area from minimal management to intensive management or modifying what uses would be permitted or prohibited within a given management category, public involvement will be sought and new environmental assessments/environmental impact statements may be necessary. This process would be subject to the requirements of the National Environmental Policy Act. Preparation of a new environmental impact statement would include full public participation in accordance with the National Environmental Policy Act and the Alaska Lands Act. A full review and updating of the plan, subject to the requirements of the National Environmental Policy Act and including full public involvement, will occur every 10 to 15 years, more frequently if necessary.

II. IDENTIFICATION OF ISSUES

II. IDENTIFICATION OF ISSUES

Section 304(g)(4) of the Alaska Lands Act requires the Service to consult with appropriate state agencies and Native corporations to ensure public interests and concerns are addressed in the plan. It also requires hearings to assure that residents affected by the administration of the refuge have an opportunity to present their views. Therefore, one of the first steps in the planning process was to develop a public participation and interagency coordination program to assist in identifying the issues that need to be addressed in the plan, the special values of the refuge, and the significant problems associated with the refuge.

PUBLIC INVOLVEMENT

The Service has conducted an extensive public involvement program for the Arctic Refuge Comprehensive Conservation Plan. During the winter of 1985-1986, the Service began seeking ideas from the public on what issues should be addressed in the comprehensive conservation plan for the refuge. Citizens throughout the country were notified that the planning process had begun through newspaper advertisements, a notice in the Federal Register, and letters; interested citizens were requested to send in their comments and concerns for the Arctic Refuge plan. In addition, a refuge planning consultation committee, consisting of a variety of interest groups, was formed and their input solicited.

Beginning in February of 1986, refuge and planning staff met with residents of Kaktovik (February 11, 1986), Arctic Village (March 18, 1986), and Fort Yukon (March 20, 1986) to learn about local issues. Community leaders and other interested residents expressed their major concerns for refuge planning. Public meetings were also held in Anchorage (April 3, 1986) and Fairbanks (April 9 and June 3, 1986).

In November of 1986, the planning team identified six management alternatives for the refuge and presented them to the consultation committee in Fairbanks. Following that meeting a workbook including all six alternatives was prepared and mailed to everyone on the refuge mailing list in January of 1987. The public was asked to comment on this range of alternatives and suggest other possible strategies for managing the refuge. The 162 responses received from the public are summarized in Table 1.

As a result of these public involvement efforts, the original range of alternatives prepared in November of 1986 was augmented with two additional alternatives using the moderate and intensive management categories.

The Service also held a series of workshops in Fairbanks (1/20/87), Anchorage (1/22/87), Arctic Village (2/10/87), Fort Yukon (2/11/87), and Kaktovik (2/19/87) to solicit comments on the proposed alternatives, and give the public an opportunity to express any concerns they might have about management of the refuge. A total of 140 individuals participated in these workshops.

Table 1. Public response to the workbook management alternatives.^{a/}

Workbook Alternatives:	Written Comments on Workbooks From:			Total
	Organizations and Groups	Individuals (Alaska)	Individuals (Lower 48)	
A--The Current Situation	-	12	-	12
B--All Wilderness	-	12	2	14
C--49% Wilderness	-	1	-	1
D--74% Wilderness	-	1	-	1
E--90% Wilderness	-	4	-	4
F--The Last Great Wilderness	7	49	53	109
No Preference Stated	6	11	4	21
Total	13	90	59	162

^{a/} The alternatives in this table do not correspond to the alternatives included in this plan. The table summarizes the public response to a preliminary set of alternatives developed early in the planning process.

With the exception of Arctic Village--where villagers strongly supported the "last great wilderness alternative"--most workshop participants raised many points for discussion but did not endorse a particular alternative. A summary of the information and opinions expressed at all five workshops and in the public response to the workbook was prepared and mailed to all interested parties in June of 1987. Copies of both the original and supplemental workbooks, as well as the workshop/workbook summary, are on file in the Service's regional office in Anchorage.

The planning team met with Alaska Department of Fish and Game personnel in Fairbanks in January of 1987 to gather additional resource information and discuss their concerns about the refuge plan. At the request of the Alaska Senate Natural Resources Committee, the planning team gave a presentation on the alternatives in Juneau on February of 1987. A presentation also was made to the Anchorage Sierra Club's local chapter at their meeting in May of 1987.

PUBLIC CONCERNS

A summary of the information provided by those who participated in the public involvement process follows. In evaluating the input received, an attempt was made to summarize the concerns expressed by the public relative to management of the refuge and to identify the important issues for the Arctic Refuge which can be addressed in the comprehensive conservation plan.

Major issues and concerns identified were: fish and wildlife resources; subsistence; wilderness; oil and gas activities; access and transportation; recreation; research; Native allotments and inholdings; land exchanges; cabins; refuge management; and the refuge planning process.

Fish and Wildlife Resources of National and International Concern

There seems to be a consensus that the fish, wildlife, and habitats of the Arctic Refuge are extraordinary assets, the "crown jewels" of the refuge system. State and local governments, conservation groups, hunters, anglers, guides, backpackers, floaters, outfitters, Native corporations, the oil and

gas industry, and people throughout the nation attested to the importance of protecting these outstanding fish and wildlife resources. The degree of protection necessary for refuge fish and wildlife, and their habitats, is probably the most difficult issue the Service must address in the plan.

Local residents from all the communities commented more frequently on protecting the Porcupine caribou herd, which provides one of the mainstays of their subsistence lifestyle, than on any other refuge resource. They were extremely concerned about the potential effects of nonlocal people and oil and gas activities on the herd. Residents stated that the caribou are as much a Canadian resource as a U.S. resource. The Service was urged to develop the plan in cooperation with the Canadian government to ensure that the herd is properly managed. A few individuals suggested that better coordination with the Canadians was needed and that this plan should provide a logical framework toward that effort.

The conservation groups desire a high degree of protection for the entire Arctic Refuge. One group wishes to propose the entire refuge as an international biosphere, because of the uniqueness of the Arctic Refuge's ecosystems. Others pointed out that people all over the world expend great efforts and amounts of money to travel to the refuge to study and experience its natural resources.

The oil and gas industry expressed the fear that many resource users would advocate levels of protection that would conflict with development interests, particularly where the "1002" coastal plain area was concerned. The industry representatives urged that all interests work closely with the Service through the planning process so that petroleum resources of the coastal plain can be developed without harm to refuge resources. They stressed the importance of the oil and gas resources of the north slope to the national security and state economy.

Subsistence

Local residents emphasized the importance of their being able to continue hunting and fishing in their traditional use areas. Local people were concerned that recreational and economic uses or activities by nonlocal people would disturb wildlife and affect their hunting. Most people in the local communities did not want to see increased sport hunting on the refuge. They stressed repeatedly that subsistence activities were essential to their way of life, providing their main sources of food. The importance local residents attributed to subsistence influenced their comments on other issues-- attitudes toward access, recreation uses, hunting, fishing, oil and gas development, land exchanges, and wilderness were often expressed in terms of their effects on the opportunities for rural residents to continue their subsistence activities. In Kaktovik, there was interest in allowing local hunters to harvest some of the reestablished muskox population. In Arctic Village, residents requested clarification on whether caribou fences were considered traditional use. Fort Yukon residents questioned the Service's ability to assure their subsistence priority over sport harvests by outsiders. Trapping was a focal point of discussion in Fort Yukon. Concerns were expressed regarding trespass by nonlocal people on lands with traditional traplines, cataloging of traditional traplines, and depletion of furbearers. In Fairbanks support for continued subsistence use was also expressed.

Wilderness

Local residents were divided in their opinions about wilderness: Arctic Village residents generally were fairly positive in their comments, so long as wilderness didn't interfere with their subsistence activities, while Kaktovik and Fort Yukon residents generally were negative. Some residents were concerned that their activities and use of refuge resources might be restricted by wilderness designation. Clarification was requested on whether wilderness designation would restrict access to Native allotments. Questions were also asked whether there were differences between a wilderness area and other areas for animals--did wilderness areas support more animals? Some local people did not like that "nonlocals" were able to decide and recommend which areas could be wilderness. Some people voiced concern that they might not be able to change the wilderness status in the future. Other residents supported wilderness designation because it would preclude commercial activities and development, thereby protecting the fish and wildlife necessary for subsistence. In Fort Yukon, some people were interested in what effect wilderness designation would have on their options for new or wider caterpillar and trapping trails. Residents were also concerned that efforts by conservation groups to designate additional wilderness would only draw more attention to Arctic Refuge, which would advertise its recreational opportunities - to the detriment of the local residents.

In both Anchorage and Fairbanks, all of the conservation groups and numerous individuals supported designating additional portions or the entire refuge as wilderness. They stated that Arctic Refuge presents a unique opportunity to protect wildlife and the arctic environment through wilderness designation. Some individuals were concerned about the effects of increased air traffic on the refuge's wilderness values. Several people recommended the Service limit group sizes and access points to protect wilderness resources. Opposition was also voiced to the Service allowing construction of public use facilities, such as campgrounds, trails, and bridges, because these facilities would encourage additional recreational use and degrade the wilderness qualities of the refuge.

The Alaska Oil and Gas Association noted its concern about proposals for designating additional large areas of wilderness in refuges. They stated that it is essential to the nation that the plan contain options for surface access and transportation needs.

Oil and Gas Activities

Oil and gas activities and the Alaska Lands Act Section 1002 studies on the coastal plain were the most discussed topics in the the meetings and in written comments. Opinions on oil and gas development on the refuge varied from total opposition to strong support. In the local communities there was a mixed reaction to oil and gas activities--Kaktovik residents generally were not opposed to oil and gas development, and believed there would be some economic benefits, while Arctic Village residents were strongly opposed to any economic development. The primary concern expressed in the local communities was that oil and gas activities would adversely affect fish, wildlife, and water quality. Village residents were concerned that an influx of oil and gas workers would increase competition for resources and change their way of life. There was special interest in the possible negative impacts on the

Porcupine caribou herd. Several people asked questions relating to the Service's (then) pending "Arctic National Wildlife Refuge, Alaska, coastal plain resource assessment-report and recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement," (hereafter referred to as the Section 1002(h) report) and what it meant to the refuge and the planning process. There were several requests for the Section 1002(h) report and the results of the seismic studies on the coastal plain.

Opposition to oil and gas leasing was expressed at all of the meetings, particularly at the Arctic Village and Fairbanks meetings. Conservation groups were very concerned about the prospect of oil and gas leasing on the coastal plain, and were opposed to leasing both within the "1002" area and anywhere else in the refuge. They stated that oil and gas activities are incompatible with the purposes of the refuge and, in view of current low oil prices, not needed. The Service was urged not to "rubber-stamp" permits for helicopter overflights associated with oil and gas activities because of their negative impacts on wildlife.

Oil and gas industry representatives expressed strong support for opening the coastal plain to leasing and urged the Service to consider the importance of oil and gas resources to the nation's energy supplies and security and the economy of Alaska. They pointed out that the "1002" area is a relatively small portion of the refuge and that development there would have little effect on the refuge as a whole. They cited the industry's past record of developing oil and gas resources (offshore and at Prudhoe Bay) without harming fish and wildlife. It was noted that because the coastal plain has been used by humans for centuries, it cannot be considered pristine.

The State of Alaska recommended that the Service should maintain opportunities for on-shore support facilities for offshore oil and gas, and maintain opportunities for geological and geophysical exploration throughout the non-1002 portions of the refuge. The State also urged that the plan acknowledge new geophysical data which suggests that the subsurface of the existing wilderness area east of the "1002" area has oil and gas potential.

(Additional comments on the question of oil and gas activities on the "1002" coastal plain area can be found in the 1002(h) report (Clough, Patton and Christiansen, 1987).)

Access and Transportation

Local residents often spoke of the need for continued use of snowmachines, motorboats, and three-wheelers for access to private lands and to their traditional hunting and fishing areas. Some people wanted to be able to build roads to and within their allotments, but also wanted to ensure that nonlocal people would not be able to use them. Many local residents opposed aircraft and helicopter use in the refuge, saying that planes made hunting too easy for nonlocal sport hunters, and helicopters and low flying airplanes often harassed wildlife, particularly caribou.

Many people expressed opposition to additional road construction because roads would destroy fish and wildlife habitats, bring in too many people, and lead to litter and enforcement problems. In Fairbanks the Service was urged to assess the impacts associated with the opening of the haul road to the public; some thought that the increased traffic on the haul road was affecting wildlife populations, particularly caribou.

Also in Fairbanks it was pointed out that the Service should coordinate with the Bureau of Land Management (BLM), and give input for their ongoing utility corridor land use plan. It was further suggested that the Service ask BLM to delay their plan until the Yukon Flats and Arctic Refuge plans were completed.

Some of the conservation groups suggested that specific areas be zoned for aircraft landing areas and flight corridors. There were individuals who recommended that the Service begin to control numbers of aircraft and minimum flight altitudes as well. At all of the meetings the Service was urged to closely control access into key fish and wildlife habitats, such as Atigun Canyon. People suggested that some rivers and alpine lakes be closed to motorboat use. Others stated that the entire refuge should be closed to all-terrain vehicles.

The Resource Development Council of Alaska urged that the plan not preclude any access opportunities to inholdings or adjacent lands. Oil and gas support industry representatives asked the Service to make provisions for additional access, primarily through utility and transportation corridors.

Recreation

Local residents interpreted recreation as use of the refuge by people who lived outside the local area. Many comments focused on sport hunters and anglers taking food that local people would otherwise use. There were also complaints about "outsiders" causing litter and waste problems. Some local residents had no problem with hikers and river floaters being in the vicinity of their communities, but voiced concern that the numbers of recreational users could increase to the point that they would interfere with subsistence activities.

In Fairbanks several people stated that the number of recreational users in the refuge is already too high. They advocated that the Service begin gathering detailed data on refuge use, and begin limiting group size and duration of stay.

Research

In the local communities people felt that Service wildlife studies, particularly telemetry studies, were adversely impacting animals. Many people felt that survey flights by refuge staff and tracking of caribou were causing much disturbance to wildlife. Fort Yukon residents were especially concerned about caribou calf mortality from darting and collaring. Several individuals asserted that they had to travel farther to hunt caribou because of increased aircraft traffic associated with refuge studies.

People in Fort Yukon and Fairbanks urged that the plan allow for continued access and educational research opportunities within the refuge, particularly geological studies. The Alaska Geological Society also urged the Service to keep Arctic Refuge open to surface geological studies.

Native Allotments and Inholdings

People in the villages were interested in how the refuge plan would affect access to and use of their individual Native allotments. They wanted to be able to use three-wheelers and other motorized vehicles to get to their land. They also wanted to be able to build houses, roads, and make other uses of their land. In Kaktovik residents requested that detailed land status maps be made available. They were concerned about recreational hikers walking across their lands and who would control user groups on refuge lands. Fort Yukon residents were concerned that nonlocal people were flying in and trapping on their allotments.

In Anchorage, a conservation group recommended that the Service identify and prioritize high value inholdings and seek to purchase them or negotiate cooperative agreements with the owners.

Land Exchanges

Residents in all of the local communities were curious about the progress of the Arctic Refuge land exchange and wanted to know which corporations were participating in the negotiations. They also questioned why the land exchange only targeted coastal plain land, not interior land.

Cabins

Several local residents stressed the importance of cabins for shelter while hunting and trapping, but there was also opposition to providing cabins for recreational use. Most people at the meetings were opposed to the Service providing facilities such as developed campgrounds for public use. Many local residents were interested in building cabins on their allotments. Some people in Fairbanks wanted the Service to remove old guide cabins from the refuge and totally restore the sites, while others stated it was acceptable for the cabins to be used by refuge staff for administrative purposes.

Refuge Management

In addition to the above comments, several other comments were expressed at the meetings on refuge management. Several oil and gas support industry representatives recommended the Service manage the area for "multiple use." Several were of the opinion that there was too much federal land "locked up." People in Fort Yukon were concerned about the water quality on and off the refuge, particularly waters which flowed past their lands. Questions were raised in Fort Yukon regarding whether mining would be allowed in the refuge. Several individuals pointed out the need to collect additional information on refuge resources. In Fairbanks, a variety of questions were raised regarding refuge management, including what types of access are allowed in the refuge; management of fire; current restrictions or regulations on recreational use; how much law enforcement is occurring along the pipeline corridor; and what control the Service has over inholdings. It was noted that illegal hunting

was occurring on the refuge, and that law enforcement efforts are generally not adequate. The Service was also urged not to build any more administrative facilities in the refuge.

The State of Alaska expressed several concerns about fish and wildlife management during the planning process. The State recommended that the Service should maintain provisions for fish and wildlife management techniques and facilities, and maintain opportunities for subsistence, commercial, and recreational use of fish and wildlife, including provisions for support facilities, equipment, and access. The Citizen's Advisory Commission on Federal Areas echoed the need for fish and wildlife management flexibility; they suggested that minimal management would preserve wilderness values without hindering the Service's ability to respond to changing conditions on the refuge.

The Planning Process

In all of the communities, and particularly in Fairbanks, it was noted that planning for the refuge was being rushed--people urged the Service to extend the planning schedule. Many people who participated in the scoping meetings expressed a desire to continue to be involved in planning and decisions relating to Arctic Refuge. Several interest groups, including hunters, fishermen, trappers, guides, conservation groups, the oil and gas industry, and Native groups, asked to be included in planning efforts. Individuals, particularly in local communities, expressed skepticism about whether they could influence the decisionmakers. At each meeting the relationship of the refuge comprehensive conservation plan to the 1002(h) report was questioned. Several individuals were concerned that land use decisions in the refuge plan be consistent with decisions resulting from the 1002(h) report. Conservation groups urged the Service to integrate the "1002" area into the refuge comprehensive conservation planning process, and not ignore it.

STATE OF ALASKA POLICY POSITION PAPER

Early in 1984 the State Conservation System Unit Coordinator's Office provided the Service with a policy position paper for Arctic Refuge and surrounding area. While this paper covered a broad spectrum of issues of concern to all state agencies, most recommendations were related to management of fish and wildlife resources. The paper identified the State's current management policies and objectives, notes management issues, and recommended solutions. The issues addressed range from public access to management of refuge resources.

A liberal approach to public access was advocated by the State. All refuge roads, trails, waterways, and aircraft landing areas that are now open should remain so. Access by the public, private landowners and the State should not be restricted. Seventeen aircraft access sites, eight water access sites, and five road and trail access sites were identified by the State as being traditional access areas. Cabins on the refuge should remain available for public use, and should be maintained.

The Service was requested to not rule out potential power projects in the refuge. Areas associated with power project development and transmission corridors should be cooperatively planned by both federal and state agencies. Coordination with the State was also requested for any action that would affect water quality or quantity in the refuge.

The importance of protecting key wildlife areas, such as spawning areas, salt licks, calving or nesting areas and stream confluences, was pointed out. Any resource exploration or development activities, or the development of refuge facilities (such as campgrounds, trails, or roads) should be avoided in these areas.

The State stressed its responsibilities for maintaining fish and wildlife populations and regulating use of fish and wildlife on the refuge--state hunting, fishing, trapping, and access regulations all apply to Arctic Refuge. It requested that the Service adopt management plans that are in substantial agreement with State black bear, brown bear, wolf, caribou, Dall sheep, moose, muskox, furbearers, small game, waterfowl, and unclassified game management plans. Maintenance of healthy prey and predator populations was noted to be an Alaska Department of Fish and Game responsibility. The State also requested the Service to cooperate with the State in the development and implementation of habitat management plans.

The State requested to maintain opportunities for implementing established fisheries enhancement techniques, and conduct future investigations on the refuge. Eighteen sites were listed as having potential for enhancement and rehabilitation because of the fish species present. The agency's ability to conduct aerial, ground, or boat surveys of fish and wildlife (including the use of helicopters) should not be unduly restricted by cumbersome permit requirements. It should be allowed to erect and maintain any facilities or structures needed for fish and wildlife management. Clarification of Section 304(d) of the Alaska Lands Act, regarding what constitutes a significant expansion of commercial fishing activities, was also requested.

Commercial big game guiding should be allowed to continue on the refuge. Changes in regulations that would affect the guiding industry should be reviewed by the State Guide Board and members of the guiding industry before being implemented.

Potential bear/human conflicts were noted to be a concern in the refuge. The State recommended continued hunting, visitor education programs and control of garbage and other attractants on inholdings to minimize these problems. The impracticality of transplanting problem bears was also noted: the State will not allow the transplant of problem bears to areas outside of the refuge boundaries.

The Service was requested to cooperate with the State in the collection, interpretation and dissemination of research data, statistical data, banding and tagging records, population data, census information, harvest tabulations and other use information for fish and wildlife in Arctic Refuge. The Service was requested to maintain opportunities for the State to conduct research projects on the refuge. Eight specific management and research needs were identified by the State.

Regarding public information, the State stressed the Service should cooperate with the State in preparing publications on refuge resources and their use. These publications should explain to the public that consumptive use of fish and wildlife are compatible with ecosystems management and will be allowed on the refuge.

Throughout its recommendations, the State urged the Service to cooperate with the Alaska Department of Fish and Game and other state agencies in managing the refuge, its resources and users. The State is particularly concerned about the management of the refuge because under State statute (AS 16.20.030) the Arctic Refuge is included in the state's refuge system. The Service was requested to cooperate with the State in conducting power project studies, monitoring developments, ensuring access, managing water, historical, and fish and wildlife resources, developing fire management plans, monitoring subsistence use, conducting research, identifying areas where adjustments in the refuge boundary should be made, and preparing publications about the refuge. Working together on these and other topics would be to the benefit of both the state and the federal governments.

MANAGEMENT CONCERNS

In addition to public involvement in identifying issues, Section 304(g) of the Alaska Lands Act requires the Service to identify and describe significant problems that may adversely affect refuge fish and wildlife and their habitats. Significant potential problems identified by the planning team, including the refuge staff, for the Arctic Refuge are discussed below. Because the intent of Congress in establishing the conservation system units relate to areas other than just "fish and wildlife" (i.e., recreation, wilderness values, water, subsistence, etc.), potential problems affecting these aspects are also identified and described. The Service identified 10 potential management concerns for the Arctic Refuge.

Oil and Gas Exploration and Development on Refuge Lands

Surface geological and geophysical exploration on the Arctic Refuge coastal plain (as regulated by 50 Code of Federal Regulations Part 37) were authorized by Section 1002 of the Alaska Lands Act. Based on information obtained through this exploration program and other sources, the Arctic Refuge's coastal plain has been identified as having a high potential for significant accumulations of oil (Clough, Patton, and Christiansen, 1987). However, the questions of whether oil is actually present, in what quantities, and in which areas, will remain largely unanswered without the drilling of exploratory wells. At the present time Section 1003 of the Alaska Lands Act prohibits oil and gas leasing, production, and any other development leading to the production of oil and gas from the refuge. Assuming that Congress decides to open the "1002" coastal plain area to further exploration and oil and gas leasing occurs, problems for fish, wildlife and habitats could occur.

The possible impacts of oil and gas exploration and development on the "1002" coastal plain area have been described in detail in Garner and Reynolds (1986) and Clough, Patton and Christiansen (1987). In summary, the level of impacts would depend upon the location and intensity of activities and degree of development. Possible problems would result from disturbance or displacement of wildlife from construction and operation of oil exploration and production

facilities, loss of habitat due to construction of oil exploration or production facilities, increased public use due to a higher human population in the area and improved access via roads and airstrips, loss of or severe restrictions on subsistence hunting opportunities in the local area, and loss of wilderness character in certain areas. If a major producing oil field is developed, a potential major impact would be the displacement of the Porcupine caribou herd from a portion of its calving area. Oil and gas activities also could have a major impact on muskox, resulting in substantial displacement from currently used habitat and a slowing of the herd's growth rate. Emissions from a production facility, including black smoke emissions, particulates, ozone, sulfuric and nitric oxides, heavy metals, and carbon monoxide, could adversely affect air and water quality. One of the most important problems will be the need for use of large quantities of water from the coastal plain area, which has a very limited water supply.

A related potential problem involves the possible use of refuge lands for support of offshore oil and gas exploration and development (see the discussion below of development and use of adjacent lands). There may be a need to locate facilities such as support bases, pumping stations, processing facilities, and pipelines on refuge lands to develop any offshore oil that may be discovered. These facilities could result in a greater magnitude of impacts than those identified for on-shore oil and gas exploration and development. The effects of offshore oil and gas support facilities would be part of the cumulative effects of oil and gas developments and other developments in the region, as discussed in the 1002(h) report.

Mining Within the Refuge

Although there are currently no mining operations in production within the refuge, there are nine active mining claims on refuge lands. The only mining activity now occurring on the refuge is that needed to meet annual assessment requirements, as prescribed in the Mining Law of 1872. If any of the claims were developed, problems for refuge resources could occur. Potential problems could include the need for access across refuge lands, wildlife disturbance in the area of operation, water quality degradation, loss or reduction of fish populations, and intrusions on the wilderness character of the affected areas. Land access could result in long-term impacts on the wilderness character of an area. If a permanent road was necessary into the developed area it could result in increased human presence, which could reduce certain fish and wildlife populations using these lands and waters.

Development and Use of Adjacent Lands

Lands adjacent to the Arctic Refuge are under the control of numerous entities: Bureau of Land Management (adjacent lands in the Trans-Alaska Pipeline System (TAPS) corridor, in the Central Arctic Management Area, and in the east-central portion of the refuge), U.S. Fish and Wildlife Service (Yukon Flats Refuge), the Minerals Management Service (federal waters beyond the three-mile limit), the State of Alaska (primarily northwest of the refuge boundary), Native (regional and village) corporations, and other private landowners. Many fish and wildlife species range between refuge lands and adjoining lands. The use and development of adjacent lands, therefore, may adversely affect fish and wildlife populations and habitats in the refuge.

Potential activities on these lands include exploration for and development of oil and gas resources, mineral development, and development of transportation and utility corridors. Developments on adjacent lands could also lead to development on the refuge. Use and development of lands adjacent to the refuge could affect fish and wildlife species and habitats both on and off the refuge. Impacts may include loss and/or alteration of terrestrial and aquatic habitats, increased pollution and littering, introduction of non-native species, and increased human use of available resources.

The State of Alaska owns the submerged tidal lands in the Beaufort Sea out to a limit of three miles (5 km) from the northern refuge boundary. The State is scheduled to hold two oil and gas lease sales in this area within the next two years (State Lease Sales 50 and 55). The state and federal governments are also involved in a legal dispute concerning ownership of submerged lands within the coastal lagoons, which are currently considered to be part of the refuge. Previous notices for the state lease sales included the lagoons within the sale areas. However, latest indications are that the lagoons will be excluded from the lease sale areas pending resolution of the ownership question.

The Minerals Management Service has jurisdiction over oil and gas development in federal waters beyond the three-mile limit. On August 22, 1984 the OCS Daiper Field Sale 87 was held in a portion of this area. A total of 227 leases were issued, covering 1.2 million acres (486,000 ha). Another lease sale, Beaufort Sea Field Sale 97, was held on March 16, 1988. As a result of that sale 202 leases were issued, covering 1.1 million acres (445,000 ha).

The possible impacts from building facilities in the refuge to support offshore oil and gas development were noted in the previous section. Even if facilities associated with offshore oil development are not placed on the refuge, the offshore activity could still affect the refuge environment. Oil spills occurring offshore could affect coastal fish, wildlife and habitats if the oil was blown or carried to the nearshore environment by wind or currents. Oil and gas activities located nearshore could also disturb nesting and staging waterfowl using the coastal areas, affect fish movement and use of lagoon waters, and affect caribou use of coastal areas for insect relief.

Oil and gas exploration and development on state lands near the refuge would probably have less effect on refuge resources than would offshore activities, depending upon the intensity of activities and development. However, most wildlife populations inhabiting the refuge do not limit their use to the area within the refuge boundaries. Because many animals move in and out of the refuge (especially caribou, bears and wolves), adverse impacts from activities on adjacent areas may be observed for some refuge populations. For instance, large-scale development on the state land between the Sagavanirktok and Canning rivers could affect the Central Arctic caribou herd. Also, the development of adjacent areas could adversely affect the wilderness, air, and water quality of the refuge.

Development or management policies on adjacent lands may increase the accessibility of refuge lands, thereby increasing the amount of public use and creating possible problems for refuge resources. For example, opening the Dalton Highway to general public use could affect the western portion of the refuge. If this occurs, public use in the western portion of the refuge will

increase. Possible management actions by the Bureau of Land Management or the State of Alaska to encourage increased public use of the Trans-Alaska Pipeline System corridor could magnify this effect.

There are numerous mining claims and a long history of mining activity on lands in the Chandalar Lake area adjacent to the refuge. This area comprises a portion of the winter range that is frequently used by the Porcupine caribou herd. Intensive mining in the Chandalar Lake area could disturb the caribou, displacing the herd from this portion of its normal winter range.

Private Inholdings Within the Refuge Boundary

There are several areas of privately owned land, primarily Native allotments and Native corporation lands, within the boundaries of the Arctic Refuge. The location and amount of lands in these private inholdings create significant long-term concerns for refuge management. Approximately 177,000 acres (71,600 ha) have been conveyed or otherwise transferred to private ownership. Another 117,000 acres (47,300 ha) of refuge lands have been selected by Native corporations, and eventually may be conveyed.

The Kaktovik Inupiat Corporation (KIC) and Arctic Slope Regional Corporation (ASRC) jointly own a tract of land near Barter Island on the north slope of the refuge. The village corporation owns the surface estate and the regional corporation owns the subsurface estate.^{a/} Three seasons of seismic exploration were conducted and one exploratory well was drilled on these lands under terms of an exchange agreement between the Arctic Slope Regional Corporation and the United States of America. However, according to the Chandler Lake land exchange agreement, whereby the regional corporation received the mineral rights, oil and gas development and production cannot occur on these lands unless Congress authorizes those activities for the Native corporation lands. Potential impacts of oil and gas operations in this area would be essentially the same as those described previously for refuge lands.

Although oil and gas development is not currently allowed on the Native corporation lands, gravel extraction is allowed. The regional corporation began development of an approximately 100,000-cubic yard (77,000-m³) gravel mine approximately one mile (1.6 km) south of Barter Island during the winter of 1986-1987. The impacts of the gravel mine have been substantially mitigated by selective placement of the site, reduction of the proposed operation and plans for rehabilitation after the useful life of the mine. Thus, impacts of the gravel mine on refuge resources are expected to be minimal, relating mainly to loss of productive wetland migratory bird habitat. Impacts on fisheries habitat are also possible. If, however, more extensive mining operations occur in the future there could be greater impacts to refuge resources, depending on the extent of the operations.

^{a/} The The Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation holdings are private lands; however, in accordance with Section 22(g) of the Alaska Native Claims Settlement Act, these lands remain subject to the laws and regulations governing development of the Arctic Refuge.

Doyon Limited, the Interior Alaska regional Native corporation, has inholdings in the refuge south of the Brooks Range. Although the corporation is known to have been interested in oil and gas development on some of these lands at one time, there are no currently known active plans for exploration or development. In the future these lands could be developed for a variety of uses, including mineral development, residential, or other commercial activities. If development occurs, refuge resources could be affected through pollution, habitat destruction, increased presence of people, etc. For instance, the development of a commercial recreational lodge would likely result in increased human use of the refuge, which in turn could affect refuge fish and wildlife populations.

In addition to the Native corporation holdings, about 173 Native allotment applications, totaling 15,000 acres (6,000 ha), have been filed on the refuge. These applications were filed under the Native Allotment Act of 1906 and were approved under Section 905 of the Alaska Lands Act, although the Bureau of Land Management has not completed pro forma notices of legislative approval on many of the applications. The allotments, which range up to 160 acres (65 ha) in size, are scattered throughout the refuge. Potential problems resulting from the use and development of these lands would be similar to those noted for surface development of the Doyon Limited lands.^{a/} One problem identified by local residents is trespass of refuge visitors on Native allotments. Other problems could result if land owners in key public access routes or recreational use areas objected to public access across or onto their lands.

Illegal Harvesting of Fish and Wildlife

There is a known history of illegal wolf and brown bear harvest on the refuge. There are also suspicions of other assorted violations throughout the refuge. The Arctic Refuge is very large; additional law enforcement staff are needed to adequately monitor the refuge and deal with illegal activities. If illegal hunting continues into the future it could interfere with the refuge purpose of maintaining fish and wildlife populations in their natural diversity.

Impacts Due to Increasing Public Use

Public use on the Arctic Refuge is not as intensive as on most refuges outside of Alaska or on some of the more accessible Alaska refuges. However, in arctic and subarctic environments problems may easily develop from a lower level of human use than that which would cause problems in more temperate regions. Fish and wildlife populations and habitats in arctic and subarctic areas, compared to those of more temperate regions, are generally more sensitive to human disturbance. Growing seasons are short and winters harsh and long. Disruption of vegetation in an area can take decades or even centuries to recover completely. Wildlife populations are subject to extreme cycles of abundance and decline. These natural cycles can be easily affected by human activities.

^{a/} Potential impacts from subsurface development would not occur on the Native allotments because the Native allotment owners would not own the subsurface rights to the land.

The refuge staff has observed an increase in public use during the late 1970s and early 1980s. Both guided and unguided recreational use levels have increased. Visitor use is likely to grow through the rest of this century. The State of Alaska is actively promoting tourism in the state, which will likely increase visitor use throughout Alaska. Another factor that will likely contribute to increased visitor use is the heightened public awareness of the refuge caused by the oil and gas controversy concerning the refuge's coastal plain.

Increased public use in certain areas may result in a correspondingly reduced use by certain animal species, particularly those that require remote wilderness habitats, such as brown bear, wolf, wolverine, and tundra swan. Habitat quality for other species also can be reduced by excessive human visitation. This may be particularly true for localized areas at critical times in a specie's life cycle, such as during calving and insect harassment periods for caribou. Conflicts between bears and humans will likely increase with increasing public use. Also, increased public use can result in reduction of esthetic and wilderness values of an area.

Another possible problem that may result from increased public use is the destruction of archeological sites that exist throughout the refuge. Increased enforcement and vigilance by refuge staff may be necessary to curtail destructive excavation and vandalism of these sites.

Conflicts Between Users

There have been relatively few user conflicts in the Arctic Refuge. Occasionally problems of overcrowding occur in localized areas during hunting seasons and the short summer recreational season. As public use increases, however, competition will increase in areas within user groups and between different user groups for limited resources. Although the Arctic Refuge covers a vast area, with seemingly unlimited areas to find solitude or wilderness, certain areas are more popular than others because of easier access or other attractions. These areas are where user conflicts will develop.

Competition may be either direct (such as between two hunting parties hunting the same spot) or indirect (such as between sport and subsistence hunters for limited resources, such as moose). Although competition is now believed to be at relatively low levels, the potential exists for competition to intensify. Competition for harvest of moose, caribou, muskox, and Dall sheep may occur between local resident, state resident and nonresident hunters. Perceptions of increased competition for resources can result in misunderstanding and increased tension between user groups, particularly between subsistence and sport hunters.

Local and nonlocal trappers are beginning to compete for choice trapping areas. This is often a conflict between Native and non-Native trappers, and centers around the concept of what constitutes a "traditional" trapping area. For Native people a traditional trapping area may be an area that a family has trapped for generations, although an individual may not have personally trapped the area within the last 10 or 20 years. For non-Native trappers, who may be relatively recent arrivals in an area, traditional may mean continuous

use over the last few years. If an area hasn't been trapped within 4-5 years, they may feel they have a right to trap in that area.

The use of cabins by local residents is allowed by the Alaska Lands Act on the Arctic Refuge for trapping, subsistence, and other traditional activities. There have been a few instances of conflicts between users of cabins that are located in close proximity to each other. This most often involves conflicts over traplines rather than cabins, but the conflicts occur nonetheless. As general public use of the refuge increases, requests for cabin use can be expected to increase as well. There probably will be more of these conflicts in the future.

Conflicts could occur in the future between consumptive and nonconsumptive users. Many nonconsumptive users are philosophically opposed to hunting, and almost all of them hold the wilderness quality of their experience to be one of the most important aspects of their visit to the refuge. While wilderness quality is also important to most hunters as well, studies have shown that it is generally less so than for backpackers and river floaters. These differing values could be a source of conflict in the future. As more people visit the refuge the potential for conflicts will probably increase.

Another possible source of conflict between users regards motorized access. Some recreational users, seeking a pristine wilderness experience, object to the use of motorized vehicles and have urged restrictions on the use of aircraft in part of the refuge. Other users, such as guides, air taxi operators, private airplane owners, and local residents, want unrestricted access.

Subsistence, Commercial and Sport Harvest of Fish

Salmon populations that spawn on the south side of the refuge are taken in commercial, subsistence and sport harvests, although no commercial fishing occurs on the refuge. The Alaska Department of Fish and Game regulates this harvest to ensure that enough adults escape to spawn, thus maintaining the fishery. However, an increase in harvest levels by any user group, on or off the refuge, could make fewer fish available. Conflicts could arise between the various user groups.

If escapement goals are not met and salmon populations decline as a result, the refuge could be adversely affected. Reduced runs could affect:

- o the number of salmon that predators have available as food;
- o the number of salmon carcasses available for scavengers and decomposers that recycle nutrients and maintain the fertility of aquatic habitats; and
- o the number of fry that various fish, birds, and mammals eat.

Commercial fishery management affects spawning and hatching success and fry survival in freshwater nursery areas and the ocean. The significance of these impacts has not been adequately assessed on a long-term basis on the refuge, but their implications call for further study.

Loss of Wilderness Values

This potential problem is reflected in most of the other problems described in this section. The degradation or loss of wilderness values is of particular concern on the Arctic Refuge because the preservation of wilderness is one of the original purposes set out for the area in the public land order establishing the Arctic National Wildlife Range in 1960.

There are several activities and developments both on lands within and adjacent to the Arctic Refuge that could affect the refuge's wilderness values. Development of oil and gas production and/or support facilities, use of helicopters for geological and other scientific studies, placement of navigation towers on the coastal plain (mainly in support of offshore oil and gas exploration), mining, development of permanent refuge management facilities, and other developments on refuge lands would likely impact the refuge's wilderness values. Development of private inholdings within the refuge, and adjacent areas in the future could result in the loss of wilderness values in the refuge. Increasing public use could adversely affect the refuge's wilderness values in popular areas. In these popular use areas opportunities for visitors to find solitude and primitive recreation will decrease. Some visitors may perceive overcrowding, increased litter, noise and water pollution, vegetative damage, and reductions in opportunities to view sensitive wildlife populations. The use of aircraft over the refuge at low levels for game spotting or sight seeing, and landing aircraft on vegetated surfaces that are easily damaged also could adversely affect wilderness values.

Need for Additional Resource and User Data

The Service has conducted intensive studies of various resources on the refuge's coastal plain in preparing the assessment required by Section 1002 of the Alaska Lands Act. However, for the rest of the refuge (about 17.5 million acres or 7.1 million ha) the database is not as sound. Additional information is needed about fish and wildlife populations, their habitat requirements, and their sensitivity to disturbance south of the "1002" area for effective management of the refuge in the future. Information on existing public, subsistence and economic uses of the refuge, and resulting impacts is particularly scarce. Adequate research and monitoring are required to record baseline conditions, determine management needs, assess potential impacts, and determine actions needed to minimize or avoid impacts.

IDENTIFICATION OF SIGNIFICANT PLANNING AND WILDERNESS ISSUES

This plan includes both alternatives for refuge management and alternatives for wilderness designation, two separate federal actions. The public raised a variety of issues in the planning process that relate to both of these actions. In identifying significant planning and wilderness designation issues for the Arctic Refuge plan, the planning team reviewed the concerns raised by refuge users, the State, local residents, and others during the planning process and the management concerns identified by the refuge staff. Table 2 summarizes the issues and areas of concern that have been identified through the scoping process for the Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement. While this table does not identify all

Table 2. Major issues and concerns identified for the Arctic Refuge Plan.

Fish and Wildlife Populations and Habitats

- o maintaining fish and wildlife populations and habitats, particularly the Porcupine Caribou herd
- o maintaining opportunities for habitat improvements

Subsistence

- o maintaining opportunities for subsistence activities

Wilderness

- o designation of additional wilderness in the refuge
- o maintaining wilderness values

Research

- o maintaining opportunities for research
- o impacts of research activities on fish and wildlife, recreation, and subsistence activities

Access and Transportation

- o maintaining opportunities for aircraft and other traditional motorized access
- o developing transportation and utility corridors
- o use of off-road vehicles (ORVs)

Public Use

- o impacts of increasing guided and unguided recreational use

Oil and Gas Activities

- o providing for oil and gas activities in the "1002" coastal plain area
- o integrating the "1002" area in the refuge plan
- o providing for oil and gas activities south of the "1002" area
- o providing for support facilities for off-shore oil and gas development

Other Economic Developments

- o mining of active claims on refuge lands
- o providing opportunities for other economic development (e.g., commercial timber harvesting)

Land Exchanges

- o land exchanges in the "1002" coastal plain area

Private Lands

- o access to inholdings within the refuge
- o development and use of inholdings within the refuge, particularly the KIC/ASRC lands
- o impacts from developments on Native allotments and other adjacent lands

Management of the Refuge

- o need for increased law enforcement
-

the issues and concerns identified, it does attempt to focus attention on those the Service considers to be most important. These issues and concerns were then analyzed in more detail to determine which issues are significant management and wilderness designation issues for the Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement.

The Service used criteria set forth in the Council of Environmental Quality's National Environmental Policy Act (NEPA) regulations (40 Code of Federal Regulations Part 1508.27) in determining what issues were significant. Issues were identified as being significant because of the degree to which the action will affect the future of wildlife in the refuge, the degree to which the action will affect the quality of the human environment, and the degree to which controversy is generated by either taking or not taking the action. Significant issues are addressed both in the management alternative and environmental consequences chapters. All other identified issues are considered to be not significant on the basis of the explanations provided below.

Issues for the Refuge Comprehensive Conservation Plan

- o What effect will the comprehensive conservation plan have on the refuge's fish and wildlife populations and habitats, particularly the Porcupine caribou herd?

This is a significant issue for the plan. One of the primary purposes of Arctic Refuge is to conserve fish and wildlife in its natural diversity. All of the actions the Service proposes in this plan must be consistent with this purpose. It is recognized both by the public and the Service that this plan will affect the future of the Porcupine caribou herd and other fish and wildlife in the refuge. The level of protection provided to the Porcupine caribou herd is one of the most controversial issues the Service must address in the plan. Many groups have urged the Service to provide a high degree of protection (i.e., designate the refuge as wilderness) to protect the caribou herd. Other groups have expressed concern that too much protection would conflict with opportunities for economic development.

- o What effect will the comprehensive conservation plan have on opportunities for habitat improvements?

This is not a significant issue. Section 303(2)(B)(i) of the Alaska Lands Act requires the Service to conserve fish and wildlife populations and habitats in Arctic Refuge in their natural diversity. The legislative history of the Alaska Lands Act emphasizes the maintenance of natural diversity and natural processes in Alaska refuges. Thus, the Service generally will only permit activities that are consistent with this intent. The Service has not identified the need for habitat improvements to maintain natural diversity in the foreseeable future on the Arctic Refuge. Although the Alaska Department of Fish and Game has requested the Service to leave open the option for habitat improvements in the refuge in the future, no specific needs for habitat improvements were identified. In all the alternatives in the plan the option exists for habitat improvements in the case of a management emergency. The refuge plan also could be revised at a future time to permit a habitat improvement proposal.

o What effect will the comprehensive conservation plan have on opportunities for subsistence activities?

This is not a significant issue for the plan. While local residents have expressed concerns about maintaining subsistence opportunities through the planning process, the Service generally would not permit activities in the plan that would significantly restrict subsistence activities. One of the primary purposes of the Arctic Refuge, under Section 303 of the Alaska Lands Act, is to provide for continued subsistence uses by local residents. Title VIII of the Alaska Lands Act provides general guidance to the Service in managing subsistence use. All the steps identified under Section 810 of the Alaska Lands Act would be followed before the Service would take action that might restrict subsistence use. The Service would only restrict subsistence uses under special circumstances in which the long-term benefit(s) of the proposed activity would far outweigh the potential impacts to the subsistence activities - and then the Service would try to minimize as much as possible the potential impacts.

o What effect will the comprehensive conservation plan have on building cabins for subsistence purposes?

This is not a significant issue for the plan. Local residents have expressed concerns about whether they will be permitted to build new cabins in the refuge for subsistence purposes. Under Section 1303 of the Alaska Lands Act the Service may permit the construction of new cabins provided "...that the proposed use...is compatible with the purposes for which the unit or area was established and that the use of the cabin is...necessary to provide for a continuation of an ongoing activity or use otherwise allowed within the unit or area where the permit applicant has no reasonable alternative site for constructing a cabin." Thus, under all of the alternatives in this plan the Service may grant a permit for a subsistence cabin on a case-by-case basis.

o What effect will the comprehensive conservation plan have on the designation of additional wilderness in the refuge?

This is a significant issue. Section 1317 of the Alaska Lands Act requires the Service to study the non-wilderness portion of the Arctic Refuge to determine its suitability for inclusion in the National Wilderness Preservation System. Upon completion of the refuge plan, the Service will forward final recommendations for wilderness to the Secretary of Interior for consideration. The question of how much wilderness should be recommended in the Arctic Refuge is highly controversial. Conservation groups and other interests have urged the Service to recommend all of the refuge for wilderness designation; other groups opposed additional wilderness designation, noting this action would preclude commercial activities and development. Whatever action the Service recommends in the comprehensive conservation plan will generate additional controversy.

o What effect will the comprehensive conservation plan have on the refuge's wilderness values?

This is a significant issue for the plan. One of the original purposes for establishment of the Arctic Range was to protect its wilderness values. The wilderness qualities of the refuge have been acknowledged by many individuals, both in words and pictures. People across the world come to the Arctic Refuge

to experience its wilderness qualities. This plan sets forth various management directions that could affect the refuge's wilderness qualities, including naturalness, opportunities for solitude and opportunities for primitive recreation. Many individuals and conservation groups are concerned about potential uses that could affect the refuge's wilderness values, and have recommended a management alternative to ensure that these values are protected in the future. The degree to which this plan protects the refuge's wilderness values will generate controversy.

- o What effect will the comprehensive conservation plan have on research opportunities?

This is not a significant issue. Although concerns were expressed during the planning process that research opportunities might be limited in the plan, the Service recognizes that research is a valid, traditional use of Arctic Refuge. One of the original interests in establishing the refuge was to provide opportunities for research in the arctic. All of the management alternatives in the plan would permit legitimate, necessary research (including geological studies), provided it was compatible with refuge purposes.

- o What effect would the comprehensive conservation plan have on "harassment" of fish and wildlife by researchers?

This is not a significant issue for the plan. Local residents expressed concern several times during the planning process that the Service's wildlife studies were adversely affecting animals. The Service does not believe it can satisfy this type of concern in the comprehensive conservation plan. To effectively manage the refuge's fish and wildlife, and meet the purposes for which the refuge was established, the Service must collect data on fish and wildlife populations, their size, reproductive success, movements, etc. Some of these studies must of necessity involve disturbance of animals, but the effects on the animal populations are negligible. Although all of the alternatives in the plan recognize the need for additional research management studies, in all cases the Service would attempt to minimize disturbance of the animals. The Service would not permit research activities that would adversely affect the refuge's fish and wildlife populations, and thus conflict with refuge purposes.

- o What effect will the comprehensive conservation plan have on aircraft and other motorized access into the refuge?

This is a significant issue for the plan. Section 1110(a) of the Alaska Lands Act provides for traditional means of access, including the use of snowmachines, airplanes and motorboats for traditional purposes on Arctic Refuge, unless such use can be demonstrated to be detrimental to refuge resources. During the planning process, some conservation groups urged the Service to restrict all aircraft access in portions of the refuge to protect wilderness qualities. If the Service were to propose such an action (which would require congressional approval to implement), it would affect the quality of life for people who use the refuge. The action also would be highly controversial--many refuge users, the State of Alaska, and other groups would oppose any action by the federal government to limit access into the refuge.

- o What effect would the comprehensive conservation plan have on developing transportation and utility corridors?

This is not a significant issue. No proposals have been made to build roads, pipelines, utility lines, or other transportation corridors through the refuge (south of the "1002" area). Under Title XI of the Alaska Lands Act a transportation corridor could be built through the refuge under all of the alternatives.

- o What effect would the comprehensive conservation plan have on the use of off-road vehicles in the refuge?

This is not a significant issue for the plan. Local residents have made little use of three-wheelers for access to private inholdings in the southern part of the refuge and to their traditional hunting and fishing areas. Concerns were expressed during the planning process that this use continue to be permitted. The Service would not restrict this use because local residents do not have to cross refuge lands to reach the inholdings. Also, under Section 811 of the Alaska Lands Act the use of three-wheelers would continue to be permitted on refuge lands if traditionally used for subsistence purposes, subject to reasonable regulations, under all alternatives. Off-road vehicles, including air boats and three-wheelers, used for recreational purposes will be restricted in accordance with Fish and Wildlife Service regulations, as outlined in 43 Code of Federal Regulations Part 36.11.

- o What effect will the comprehensive conservation plan have on public use (guided and unguided recreational use) levels in the refuge?

This is a significant issue for the plan. The Arctic Refuge has attracted visitors from around the world for years. The Service has always permitted hunting, fishing, trapping, and nonconsumptive recreational uses when such uses do not conflict with the primary purposes of the refuge. These uses will continue to be permitted under all of the management alternatives in this plan. Section 1316 of the Alaska Lands Act also provides for guides and outfitters, and associated facilities, on refuge lands:

On all public lands where the taking of fish and wildlife is permitted in accordance with the provisions of this Act or other applicable State and Federal law the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuance of existing uses....

Concerns were expressed during the planning process, however, that recreational use is already high in portions of the refuge, and that increasing use in the future would adversely affect the refuge's wilderness qualities. A recommendation was made, as part of one management alternative offered by conservation groups, to conduct carrying capacity studies and then limit public use (starting with guided groups) if necessary to maintain a high quality wilderness recreational experience. If the Service were to take such an action it would affect the quality of life of refuge users and would generate controversy among various refuge user groups.

- o What effect will the refuge comprehensive conservation plan have on oil and gas development in the "1002" coastal plain area?

This is not a significant issue for the comprehensive conservation plan. During the scoping process, oil and gas activity in the "1002" area was one of the most controversial topics discussed by the public. Although this issue is controversial, it is not appropriate to include a discussion in the refuge comprehensive conservation plan. Future management options and their environmental consequences for the "1002" area are discussed in the 1002(h) report. The Secretary of Interior's recommendation in this report (that the entire area be made available for leasing) has been forwarded to Congress. Thus, Congress will determine the future management of the "1002" area. When Congress acts, its directives will be incorporated into the refuge comprehensive conservation plan and the Service will manage the area accordingly.

- o Should the "1002" area be integrated into the refuge comprehensive conservation plan?

This is not a significant issue. All discussions of the resources and uses in the "1002" coastal plain area are addressed in the 1002(h) report (Clough, Patton and Christiansen, 1987), and are incorporated by reference into this document. The Service is presently managing the "1002" area as it has done in the past, essentially as a minimal management area. Until the Congress takes action on the future of the "1002" area the Service will continue this practice. In all alternatives included in this comprehensive conservation plan for the Arctic Refuge, the "1002" area is treated as a minimal management area. Actions that the Congress may take in the "1002" area--including making it available for oil and gas exploration and development or designating it as wilderness--will not be addressed in this plan. Any decision made by the Congress regarding the future management of the "1002" area will be incorporated into this plan and implemented. Should any additional studies or a wilderness review of the "1002" area be required, they will be undertaken and completed at that time (see the "Wilderness Review of the 1002 Area" in the Introduction for a more detailed explanation).

- o What effect will the comprehensive conservation plan have on oil and gas activities south of the "1002" area?

This is a significant issue for the plan. The Service is treating the question of oil and gas development on Arctic Refuge differently than it has in the other refuge comprehensive conservation plans. The other plans addressed the potential for oil and gas development under Section 1008 of the Alaska Lands Act. The Arctic Refuge, however, is closed to oil and gas development under Section 1003 of the Alaska Lands Act. Although only Congress can open the refuge to oil and gas leasing, interest has been expressed in conducting oil and gas studies and having other portions of the refuge south of the "1002" area open to exploration and development. The 1002(h) report did not address the possibility of oil and gas development occurring south of the "1002" area. To examine a full range of alternatives, and thus fulfill requirements of the National Environmental Policy Act (NEPA), the Service must examine the possibility of oil and gas development south of the "1002" area in the refuge plan. Any recommendation the Service makes in this regard would be highly controversial.

- o What effect will the comprehensive conservation plan have on oil and gas support facilities for offshore oil and gas development?

This is not a significant issue for the plan for two reasons. First, when Congress acts on the future management of the "1002" area it could permit this activity as part of the "1002" legislation. Second, if the support facilities were part of a transportation system they could be permitted under the provisions of Title XI of the Alaska Lands Act. The Service would have to consider on a case-by-case basis any request for such facilities on Native lands subject to the provisions of Section 22(g) of the Alaska Native Claims Settlement Act.

- o What effect will the comprehensive conservation plan have on mining of active claims on refuge lands?

This is a significant issue for the plan. Section 304(c) of the Alaska Lands Act withdrew all public lands in each national wildlife refuge in Alaska from location, entry, and patent under the mining laws (hardrock minerals). This withdrawal, however, is subject to valid existing rights. As of March, 1988, there were nine active mining claims on Arctic Refuge. The Service cannot prevent mining activity from occurring on valid claims or on lands with private subsurface ownership. If mining were to occur within the Arctic Refuge boundary, there is the potential for water quality impacts and other impacts both to refuge resources and users. Depending on the nature of the operation, mining could be controversial.

- o What effect will the comprehensive conservation plan have on other economic uses, such as commercial timber harvesting?

This is a significant issue for the plan. During the planning process the Service was urged to provide opportunities for economic uses on the south side of the refuge, such as commercial timber harvesting. The Service could permit commercial timber harvesting in the refuge, provided it is compatible with refuge purposes. Although no specific proposals have been made to the Service, to fulfill National Environmental Policy Act requirements an alternative that provides for commercial timber harvesting was included in the plan. Other alternatives would not permit this use. Any action the Service takes could be controversial.

- o What effect will the comprehensive conservation plan have on land exchanges in the "1002" coastal plain area?

This is not a significant issue for the plan. The question of land exchanges in the "1002" area was brought up many times during the scoping process. The Department of Interior's efforts related to a possible land exchange have been independent of those aimed at preparing the refuge comprehensive conservation plan. Although the Secretary of Interior is authorized under Section 1302 of the Alaska Lands Act to exchange lands, the Department has indicated that it will undertake no exchanges in the Arctic Refuge without the express approval of Congress. Additionally, the Department has indicated that any exchanges are contingent upon Congress opening the "1002" area to oil and gas exploration, development, and production, and upon congressional approval of any exchange agreement. Completion of the refuge comprehensive conservation plan will not have any bearing on whether these land exchanges occur.

- o What effect will the comprehensive conservation plan have on access to inholdings within the refuge?

This is not a significant issue for the plan. Under Section 1109 of the Alaska Lands Act, valid existing rights of access are guaranteed. Section 1110(a) allows the use of snowmachines, motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities and for travel to and from villages and homesites, subject to reasonable regulation. Under Section 1110(b) the State and private interests with valid surface or subsurface rights on or surrounded by Arctic Refuge are entitled to adequate and feasible access across the refuge. Such access may be subject to reasonable regulations to protect the resource values of the land or to protect public health and safety. This plan cannot by itself deny access.

- o What effect will the comprehensive conservation plan have on the development and use of inholdings within the refuge, particularly the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands?

This is not a significant issue for the plan. Concerns were expressed during the planning process about what uses and developments could occur on private lands within the refuge boundary. The Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands are subject to Section 22(g) of the Alaska Native Claims Settlement Act. Although the Native corporation lands are privately owned and no longer part of the refuge, under Section 22(g) the Service retains residual controls on the use and development of the lands conveyed to Native corporations under the Native Claims Act. Congress will determine whether oil and gas production occurs on refuge lands in the "1002" coastal plain area, including some Native corporation lands that are within the "1002" area. Oil and gas activities on the Native corporation lands adjacent to the "1002" area are subject to the stipulations attached to the Chandler Lake land exchange agreement. Those stipulations allow exploration, including drilling. The Chandler Lake stipulations will be superseded by environmental stipulations established by Congress for any oil and gas activities authorized within the "1002" area. The Service is working with the Native corporations and the Alaska Federation of Natives to identify what other uses and developments would be permitted on the 22(g) lands. To ensure that mutual biological resource values are protected, the Service will subsequently promulgate regulations through the public involvement process that specify what uses and developments are in compliance with refuge rules and regulations, and what stipulations or mitigation measures may be necessary.

For other private lands within the the Alaska Lands Act additions to the refuge the refuge comprehensive conservation plan would have no effect--the Service does not have authority to regulate the use of private inholdings or use of lands where valid occupancy rights exist.

- o What impact will the comprehensive conservation plan have on impacts from developments on adjacent lands?

This is not a significant issue for the plan. The plan cannot address this question because the Service has no authority to regulate the use of lands outside the refuge or the activities that occur on those lands. In all of the alternatives, however, the Service will work with adjacent landowners to minimize the potential for impacts from their activities and developments. If

refuge resources are adversely affected by off-refuge development, the Service would have the same remedies under state and federal law that any landowner would have. The Service would cooperate with the appropriate agency(ies) to resolve the problem. The Service will rely on the U.S. Environmental Protection Agency, State of Alaska Department of Environmental Conservation, and other appropriate local, state and federal agencies to enforce compliance with environmental laws and pollution control standards.

- o What impact will the comprehensive conservation plan have on the level of law enforcement?

This is not a significant issue. Law enforcement is a Service responsibility. Service personnel have exercised law enforcement authority on the refuge for many years, and will continue to do so. Regardless of the plan, the Service will, to the best of its ability, enforce all laws and regulations under its jurisdiction. Funding and staff limitations, and the remoteness of the refuge are the primary factors affecting law enforcement.

Significant Issues for the Refuge Comprehensive Conservation Plan

In summary, the Service identified eight significant issues for the plan:

- o What effect will the plan have on the refuge's fish and wildlife populations and habitats, particularly the Porcupine caribou herd?
- o What effect will the plan have on the designation of additional wilderness in the refuge?
- o What effect will the plan have on the refuge's wilderness values?
- o What effect will the plan have on aircraft and other motorized access into the refuge?
- o What effect will the plan have on public use (guided and unguided recreational use) levels in the refuge?
- o What effect will the plan have on oil and gas activities south of the "1002" area?
- o What effect will the plan have on mining of active claims on refuge lands?
- o What effect will the plan have on other economic uses, such as commercial timber harvesting?

Issues for Wilderness Designation

- o What effect would wilderness designation have on the level of the refuge's fish and wildlife populations and habitats?

This is not a significant issue. One of the primary purposes of the Arctic Refuge, under Section 303 of the Alaska Lands Act, is to conserve fish and wildlife in their natural diversity. Section 4(a) of the Wilderness Act states that the designation of wilderness within a national wildlife refuge must supplement the purposes for which the refuge was established. Therefore, wilderness designation would not prevent the Service from achieving the purpose of conserving the refuge's fish and wildlife populations. Regardless of whether or not additional wilderness is designated in the Arctic Refuge, the Service will manage the refuge to conserve fish and wildlife populations in their natural diversity, on a refuge-wide basis.

Wilderness designation also would not affect how the Service cooperates with the Alaska Department of Fish and Game, the Alaska Boards of Fish and Game, and Canada in managing the refuge's fish and wildlife.

The Porcupine caribou herd is widely recognized to be an important resource of the Arctic Refuge. This document expressly addresses potential impacts to caribou in the Arctic Refuge both under the biological effects of each alternative and the effects on wilderness values in the "Environmental Consequences" chapter.

- o What effect would wilderness designation have on opportunities for habitat improvements?

This is not a significant issue. As noted earlier in this chapter, Congress emphasized the maintenance of natural diversity and natural processes for refuges in the Alaska Lands Act. In this regard the Service will manage both wilderness and non-wilderness areas in the Arctic Refuge in the same way. The Service has not identified the need for habitat improvements such as mechanical manipulation or water diversions to maintain natural diversity in the foreseeable future on the Arctic Refuge. Although the Alaska Department of Fish and Game has requested the Service to leave open the option for habitat improvements in the refuge in the future, no specific needs for habitat improvements were identified. In all the alternatives in the plan the option exists for prescribed burning and minor habitat improvements, subject to the minimum tool concept, in wilderness. Wilderness designation would preclude certain habitat improvement techniques, such as mechanical crushing (although these habitat improvements could be permitted in the case of a management emergency). The Service has no plans to undertake any habitat improvements in the Arctic Refuge in the long term. The economic and physical feasibility of undertaking such activities is not likely to change over the near future.

- o What effect would wilderness designation have on opportunities for subsistence activities?

This is not a significant issue. One of the primary purposes of Arctic Refuge, under Section 303 of the Alaska Lands Act, is to provide for continued subsistence uses by local residents. Wilderness designation would not restrict hunting, fishing, trapping, or other subsistence activities, nor does it restrict access by snowmachines, motorboats, or other means of surface transportation traditionally employed for such purposes by local residents--the Service would manage the refuge to provide for subsistence use, regardless of whether or not additional wilderness is designated on Arctic Refuge.

- o What effect would wilderness designation have on the refuge's wilderness values?

This is a significant issue. One of the original purposes for establishment of the Arctic Range was to protect its wilderness values. Wilderness designation would permanently protect the wilderness values of an area--congressional action would be required to remove an area from the National Wilderness System. On the other hand, wilderness designation would preclude various economic uses and management directions that could adversely

affect the refuge's wilderness qualities, including naturalness, opportunities for solitude and opportunities for primitive recreation. During the planning process some groups expressed concern that wilderness designation would preclude opportunities for development. The location and amount of proposed wilderness will generate controversy.

- o What effect would wilderness designation have on research opportunities?

This is not a significant issue. The Service recognizes that research is a valid, traditional use of all of Arctic Refuge. Designating additional wilderness in the refuge would have no effect on research opportunities--all of the management alternatives in the plan would permit legitimate, necessary research in wilderness and non-wilderness areas, provided it was compatible with refuge purposes. The Service's Refuge Manual (6 RM 8.9H) states that scientific uses may be permitted when the "minimum tool" concept is adhered to for all equipment. (Minimum tool is defined as the minimum action or instrument necessary to successfully, safely, and economically accomplish wilderness management objectives.)

- o What effect would wilderness designation have on aircraft and other motorized access into the refuge?

This is not a significant issue. Section 1110(a) of the Alaska Lands Act provides for the use of snowmachines, airplanes and motorboats for traditional activities on all of Arctic Refuge, including wilderness areas, unless such use can be demonstrated to be detrimental to refuge resources. Designating additional wilderness would not, by itself, affect aircraft access into the refuge.

- o What effect would wilderness designation have on developing transportation and utility corridors?

This is not a significant issue. No proposals have been made to build roads, pipelines, utility lines, or other transportation corridors in the refuge (south of the "1002" area). Under Title XI of the Alaska Lands Act a transportation corridor could be built through the wilderness area, with the approval of the President and Congress.

- o What effect would wilderness designation have on public use (guided and unguided recreational use) levels in the refuge?

This is not a significant issue. In all of the alternatives in the plan the Service would permit sport hunting, fishing, and backpacking, river floating, and other nonconsumptive recreational uses throughout the refuge, including wilderness areas, provided such uses do not conflict with the primary purposes of the refuge. Guides and outfitters also would continue to be permitted in wilderness areas, as provided for in Section 1316 of the Alaska Lands Act. The Service will manage the level of public use in the refuge, including wilderness areas, to ensure that refuge resources are maintained and user conflicts are avoided--designating additional wilderness areas, by itself, would not affect the Service's management of public use (i.e., the level of guided and unguided use permitted in the refuge). There is potential for recreational use to increase as a result of wilderness designation, although

this increase is expected to be negligible. Recreational use would be expected to increase above current levels whether or not additional wilderness is designated in the refuge.

Wilderness designation would preclude the development of visitor facilities (although improved facilities essential to protect refuge and wilderness resources, prevent or correct unsanitary conditions, disperse visitors, reduce other hazards, or to control other uses may be permitted), the development of new permanent facilities by guides or outfitters, and the use of motors. These points were not raised as an issue, however, during the planning process.

- o What effect would wilderness designation have on the level of oil and gas activities south of the "1002" area?

This is a significant issue. Wilderness designation at present would have little effect because all of the refuge is now closed to oil and gas leasing under Section 1003 of the Alaska Lands Act. Interest has been expressed, however, in conducting oil and gas studies and possibly having other portions of the refuge south of the "1002" area open to exploration and development. If additional areas in the refuge were to be designated by Congress as wilderness, surface geologic studies and geophysical studies (other than seismic surveys) may continue to be permitted in the areas. Seismic surveys and core sampling, involving mechanized surface transportation or motorized equipment, would not be allowed (unless the studies are conducted by an Interior Department agency or contractor under Section 1010 of the Alaska Lands Act), nor would oil and gas leasing and development be permitted. If commercial quantities of oil and gas are present, wilderness designation would reduce the nation's available energy supply. The issue is controversial because development interests would like to see additional areas made available to oil and gas leasing, while conservation groups would like more wilderness areas.

- o What effect would wilderness designation have on the level of mining development on refuge lands?

This is a significant issue. Under Section 304(c) of the Alaska Lands Act where valid claims exist mining activities must be allowed, subject to all applicable state and federal laws and regulations. This would be true in both wilderness and non-wilderness areas. If wilderness were designated, however, the Service would probably conduct more monitoring than it might elsewhere. Although adequate and feasible access to mining claims is guaranteed under Section 1110(b) of the Alaska Lands Act, if wilderness were designated the Service might promulgate more regulations to ensure that refuge resources are protected than it would in a non-wilderness area. Designating additional wilderness thus could be controversial, if it is perceived this designation would limit what actions miners can take in conducting their operations.

- o What effect would wilderness designation have on the level of commercial timber harvesting?

This is a significant issue. During the planning process the Service was urged to provide opportunities for commercial timber harvesting on the south side of the refuge. Wilderness designation would preclude the possibility of commercial timber harvesting. The issue is controversial because some groups want to designate additional wilderness in the refuge, while other groups want to keep open options for future commercial timber harvesting (which wilderness designation would preclude).

- o What effect would wilderness designation have on access to inholdings within the refuge?

This is not a significant issue. Wilderness designation would have no effect on access to inholdings within the refuge. Several provisions of the Alaska Lands Act (i.e., Sections 1109, 1110(b)) ensure access to inholdings. These provisions apply to designated wilderness as well as to other refuge lands.

- o What effect would wilderness designation have on the development and use of inholdings within the refuge, particularly the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands?

This is not a significant issue. The Service cannot propose inholdings within the refuge for wilderness designation. Wilderness designation would have no effect on actions taken on these lands--the Service does not have authority to regulate the use of private inholdings or use of lands where valid occupancy rights exist. In all of the alternatives, regardless of whether or not additional wilderness is designated in the refuge, the Service would cooperate with adjacent landowners to minimize impacts from the refuge.

Native corporation lands would not be included in a wilderness because these lands are not under federal ownership. Wilderness designation would not affect how the Service applies refuge rules and regulations to Native lands subject to Section 22(g) of the Alaska Native Claims Settlement Act. Under Title XI of the Alaska Lands Act the Native corporation would be assured of access to its lands, regardless of whether the surrounding lands were designated as wilderness. No selected lands have been included in wilderness proposals in the plan.

- o What effect would wilderness designation have on impacts from developments on adjacent lands?

This is not a significant issue. The Service has no authority to regulate the use of lands outside the refuge or the activities that occur on those lands, even if these activities are occurring adjacent to designated wilderness. Regardless of whether additional wilderness is designated in Arctic Refuge, the Service will work with adjacent landowners to minimize the potential for impacts from their activities and developments. If refuge resources are adversely affected by off-refuge development, the Service would take the same action regardless of whether or not the resources are in a designated wilderness area--the Service would have the same remedies under state and federal law that any landowner would have. The Service would cooperate with the appropriate agency(ies) to resolve the problem.

Significant Issues for Wilderness Designation

In summary, the Service identified four significant issues for wilderness designation:

- o What effect would wilderness designation have on the refuge's wilderness values?
- o What effect would wilderness designation have on the level of oil and gas activities south of the "1002" area?
- o What effect would wilderness designation have on the level of mining development on refuge lands?
- o What effect would wilderness designation have on commercial timber harvesting?

PUBLIC REVIEW OF THE DRAFT PLAN

The draft Arctic Refuge plan was made available for public review and comment in January, 1988. The 90-day public comment period closed on April 25, 1988. The Service has received 961 written and 42 oral responses on the draft plan from local, state, and federal agencies, industry, native corporations, conservation groups, and other interested parties and individuals. A representative sample of these letters, as well as the Service's responses to selected comments made in these letters, may be found in Appendix Q of this document.

Public meetings on the draft plan were held in Kaktovik, Fort Yukon, and Arctic Village during March and April 1988. Formal public hearings were held in Fairbanks on March 22, 1988, and in Anchorage on March 24, 1988. A total of 116 people attended these meetings and hearings, with 42 persons offering testimony. All village meetings were taped. Transcripts of the Fairbanks and Anchorage public hearings are available at the Service's regional office in Anchorage.

Table 3 provides an overview of public response to the seven alternatives found in the draft plan. The table also provides an indication of the organizations supporting each of these alternatives.

All comments received, both written and oral, were taken into consideration during the preparation of this final plan. It is important to note that the selection of a preferred alternative is not based solely on how many people support a particular alternative. Public comment is only one of several criteria used in the selection of the Service's preferred alternative.

Table 3. Analysis of public comments on the draft Arctic Refuge plan.

Alternative	A	B	C	D	E	F	G	More Wilderness ^a	No Choice ^b
Meeting Testimony	5	-	-	-	-	-	28	4	5
Written Responses									
Individuals	6	1	-	-	1	6	422	324	80
Form Letters	-	34	-	-	-	-	42	7	2
Organizations	4	-	-	-	2	1	18	9	2
Total Comments	15	35	-	-	3	7	510	344	89

- Supporting Alt. A
 - * State of Alaska
 - * Resource Development Council
 - * Alaska Oil & Gas Association
 - * Citizens Advisory Commission
 - * Atlantic Richfield
 - * Kaktovik Public Meeting
- Supporting Alt. E
 - * Alaska Wildlife Federation
 - * National Wildlife Federation
- Supporting Alt. F^c
 - * International Porcupine Caribou Commission
 - * Fort Yukon Public Meeting
 - * Arctic Village Public Mtg.
- Supporting Alt. G
 - * Northern Alaska Environmental Center
 - * Alaska Wildlife Alliance
 - * Alaska Sierra Club
 - * Trustees for Alaska
 - * Friends of the Earth
 - * Tanana Chiefs
- Supporting More Wilderness
 - * Audubon Society
 - * Wilderness Society
 - * National Wildlife Refuge Association
 - * Alaska Center for the Environment

Supporting Alts. A, B, or C . 50 Commenters or 5%

Supporting Alts. D, E, F, G, or More Wilderness . 864 Commenters or 86%

No Choice expressed 89 Commenters or 9%

^a Those commenting without indicating a preference for any alternative, but supporting the designation of additional wilderness in the refuge.
^b Those commenting without indicating a preference for any alternative.
^c The International Porcupine Caribou Commission and those attending the Fort Yukon and Arctic Village meetings supported wilderness designation for the entire refuge, with the exception of certain areas in the vicinity of Arctic Village that are used extensively by villagers. Alternative F has been modified to reflect their request.

REVISIONS TO THE DRAFT COMPREHENSIVE CONSERVATION PLAN

In response to comments on the draft Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review/Wild River Plan, several changes were made in this final document. Tables and figures have been corrected where necessary, and in some cases additional tables and figures have been added to the text. In addition to editorial and factual changes made throughout the text, tables and figures, the following substantive changes were made in the draft plan:

- o Wilderness proposals: The Alternative D, E and F wilderness proposals were modified to address concerns expressed by the International Porcupine Caribou Commission and Arctic Village. Refuge lands around Old John Lake, on the Junjik River from Timber Lake to its confluence with the East Fork of the Chandalar River, along the East Fork of the Chandalar River north to Red Sheep Creek, and on the lower Wind River have been deleted from the wilderness proposals. In addition, the proposed wilderness boundary in the southeast corner in Alternative E was drawn back to the Porcupine River.
- o Revision of the plan: a new paragraph has been added to both the "Introduction" and "Environmental Consequences" chapters regarding revisions to the plan following congressional action on the management of the "1002" area.
- o Mechanical manipulation in minimal management areas: A new appendix, Appendix P, has been added to the document, which describes the Service's regional policy on this management action.
- o Common management direction on land exchanges and acquisitions: This management direction in Chapter V has been revised to address other forms of acquisition of inholdings from willing sellers.
- o Common management direction on public access and transportation: The Service's regulations on the use of off-road vehicles (Title 43, Code of Federal Regulations, Part 36.11) has been added to the text."
- o Common management direction on cabin management: This has been rewritten to clarify the Service's management direction on the Arctic Refuge.
- o Common management direction on mining operations: References to mitigation, plans of operation, and special use permits have been deleted.
- o Description of the Porcupine caribou herd: This section in Chapter IV has been rewritten in the final plan.
- o Discussion of subsistence: A new composite figure showing general areas where local residents harvest resources in and near the Arctic Refuge has been added to the document.

- o Resource harvest data: Updated Alaska Department of Fish and Game preliminary harvest data have been added to the text. Also, all subsistence harvest data have been moved from the fish and wildlife descriptions to the discussion of subsistence uses in Chapter IV.
- o Wilderness review: Reference to active mining claims in the refuge has been added to the text.
- o Assessment of impacts on threatened and endangered species: A new section has been added to the "Environmental Consequences" chapter that discusses the impacts of each alternative on the refuge's threatened and endangered species.
- o Assessment of mining in Alternative E: A discussion of the effect of wilderness designation on the mining development in the Alternative E scenario has been added to the text.
- o Effects of wilderness designation in Alternative F: A new section has been added to the final plan assessing the impacts on wilderness values and economic uses in areas not proposed for wilderness designation.

FUTURE PUBLIC INVOLVEMENT

No sooner than 45 days following publication of the final plan, the Service will issue a record of decision that describes the alternative to be implemented. Should the Service receive any comments during this time period that require a change(s) in the preferred alternative or clarification of the management directions in the final plan, the change(s) will be described in the record of decision.

Both federal law and Service policy requires the Service to consider public input in environmental decision-making. A public participation program therefore will be a part of the development of plan updates as well as appropriate management plans. Every three to five years following adoption of the final plan the Service will review all public comments and official suggestions to keep the plan current. The public will be advised of these updates and urged to comment.

III. SPECIAL VALUES OF ARCTIC REFUGE

III. SPECIAL VALUES OF ARCTIC REFUGE

Section 304(g) of the Alaska Lands Act requires the Service to identify and describe:

the special values of the refuge, as well as any other archaeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness values of the refuge.

In response to this requirement, the Service identified four special values for Arctic Refuge: wilderness; ecological; geological/paleontological; and scenic/recreational values. Figure 4 shows the locations of some of the areas within the refuge that demonstrate these special values. Most of these areas have more than one special value.

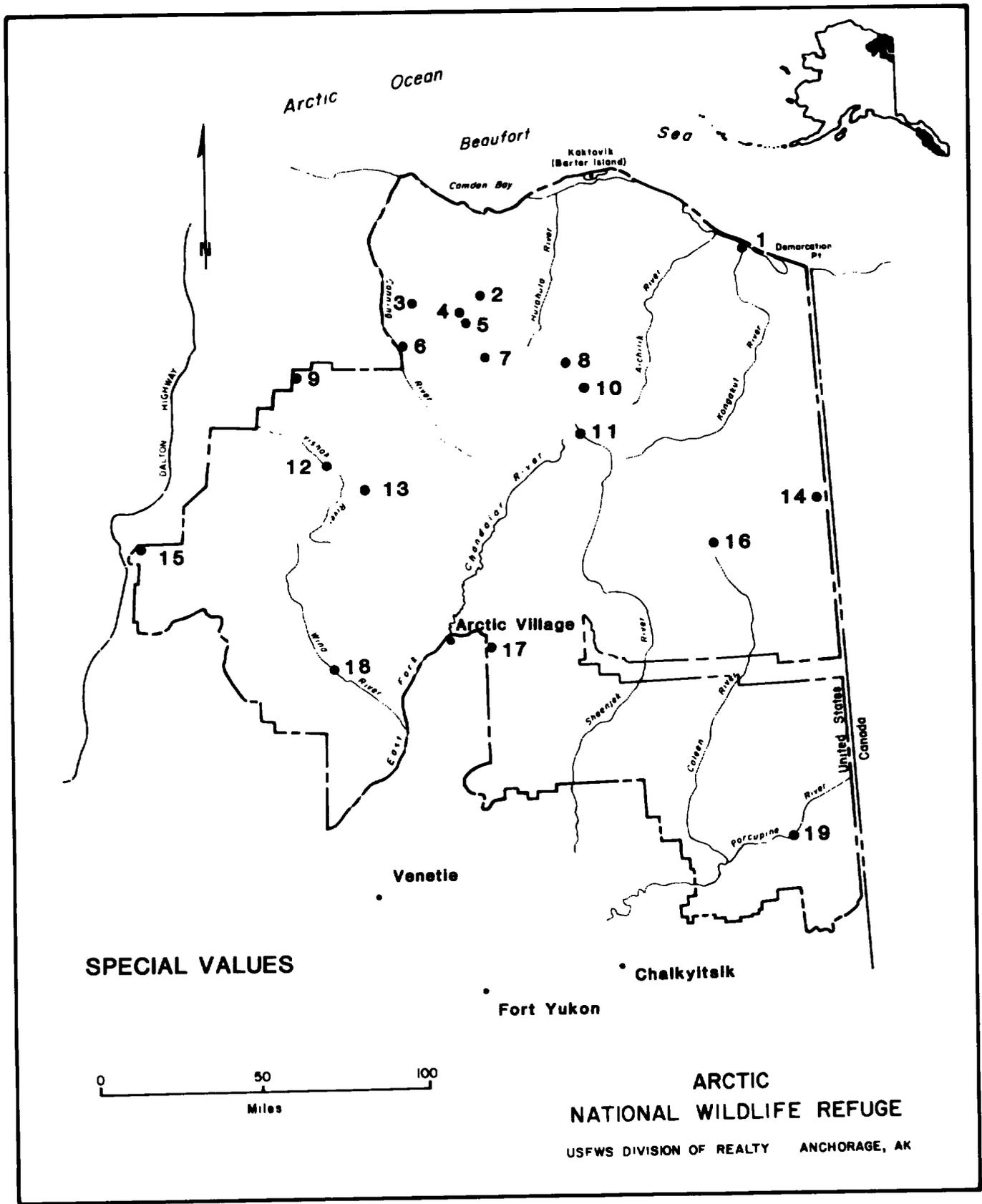
Wilderness Values

The original public land order (2214) that established the Arctic National Wildlife Range on December 6, 1960, specified that the refuge's purpose was to preserve "...unique wildlife, wilderness and recreational values...." The Arctic Refuge's wilderness qualities stand out among its many special values. The need to preserve a portion of the Brooks Range and arctic Alaska's great wilderness values formed the original basis for establishing the Arctic Range. Unlike many other refuges in the national wildlife refuge system, the Arctic Refuge was not established out of a singular need to conserve wildlife. Instead, the refuge was established out of a concern for the wilderness ecosystem of northern Alaska as a whole--it was the physical features (tallest peaks in the Brooks Range, most glaciers, remoteness, and habitat diversity) and not the wildlife resources alone that originally drew focus to this area. Later field work reinforced the conviction that northeast Alaska was the best place to preserve an arctic wilderness ecosystem.

The wilderness qualities of the Arctic Refuge have been acknowledged by many individuals, both in words and pictures. Numerous popular articles have been written about the refuge's wilderness qualities, including: Collins and Sumner (1953), Anonymous (1953), (1956), (1957a), (1957b), Sumner (1956), Tall (1959), Douglas (1960), Milton (1961), Murie (1962), Dean (1965), Brower (1971), Laycock (1976), Chadwick (1979), Abbey (1984), and Kerasote (1984). Olav Hjeljord, who has skied from Barter Island to Arctic Village and hiked alone from Barter Island to Arctic Village, stated:

The feature which makes the Wildlife Range worth preserving is its vast expanse of land free from human influences and tracks. The feeling this gives the hiker of being the first man ever to roam its valleys and to climb its mountains and while so doing, if he wishes, to live off the land with fish tackle and gun in hand. On our increasingly crowded earth, this is a quality which, if preserved, may make the Arctic Wildlife Range unique on the globe. (Hjeljord, 1973)

Figure 4. Selected areas with special values in the Arctic Refuge.



LEGEND

1. **The Beaufort Lagoon, Icy Reef, and Kongakut River area**
2. **The Sadlerochit Mountains**
3. **Ignek Creek**
4. **Ignek Mesa**
5. **Fire Creek**
6. **The Shublik Hot Springs and Canning Forest area**
7. **Peters and Schrader Lakes**
8. **The Okpilak River Valley**
9. **The Ehooka River area**
10. **The high peaks area**
11. **The Upper Sheenjek River**
12. **The Ivishak River**
13. **Porcupine Lake**
14. **The Firth River-Mancha Creek RNA**
15. **Atigun Canyon**
16. **The Upper Coleen River area**
17. **Old John Lake**
18. **The Wind River**
19. **The Ramparts of the Porcupine River**

John P. Milton, also wrote of the refuge's wilderness qualities after hiking 300 miles (480 km) across it:

This is wilderness on a scale that the mountain men knew in our far west during earlier days. To have the mood requires hundreds of miles of empty lands and large expanses of unexplored territory. This Brooks Range wilderness still has these elements in abundance, and imposes upon you a need for self-reliance.

Here is an atmosphere of nature at its untamed, uncivilized best. The wilderness stands on its own: free, not propped by access roads, park rangers, interpretive centers, and regulations on use....Here there is no prostitution of the freedom so essential to wilderness - and the quality of the experience reflects this. (Milton, 1969)

Several congressional reports, prepared during the the Alaska Lands Act debates, also acknowledged the area:

The Arctic National Wildlife Range is spectacularly scenic. Unlike elsewhere in the Alaska Arctic, the transition zone from mountains to coast is compressed into a relatively compact area. Within 150 miles there is a complete wilderness transect from the forested Brooks Range South Slope to the Beaufort Sea. The wildlife populations are varied and abundant. These values alone merit the highest level of protection. (96th Congress, 1st Session, House Report No. 96-97, Part I)

The Arctic Wildlife Refuge is an arctic and subarctic wilderness of incredible beauty. The rich and varied ecosystem of 18.7 million acres is inhabited by thriving populations of plants and animals. This Wilderness has come down through the ages, and it is a heritage that future generations, living in an industrial world even more complex than ours, will surely cherish. (96th Congress, 1st Session, House Report No. 96-97, Part II)

Ecological Values

The continuum of ecosystems in the Arctic Refuge is unique in the United States. It is the only area where people may practicably travel on foot or by boat and traverse a full range of arctic and subarctic landscapes and habitats due to the close proximity of the coast and mountains--in a space of less than 150 miles (240 km) one can travel from the taiga forests of the Brooks Range south slope to the lagoons of the Beaufort Sea.

The diversity of resources of the refuge, including landforms, habitats, fish and wildlife, and subsistence and recreational uses is noteworthy in Alaska. The refuge supports a full complement of arctic flora and fauna, including arctic grayling, arctic char, whitefish, salmon, brown and black bear, Dall sheep, bald and golden eagles, caribou, peregrine falcon, polar bear, muskox, moose, wolf, wolverine, and other species of special interest to many Americans. The refuge includes much of the calving area and the winter range for the Porcupine caribou herd, one of the largest in North America. It also is the site of the most successful mainland reintroduction of muskox in Alaska. Presently the refuge's coastal plain supports about 400 muskox.

There are several sites within the refuge that have been identified to have special ecological values:

- o The Firth River-Mancha Creek Research Natural Area encompasses several biologically unique habitats within the refuge. The area apparently was an arctic montane refugium during Pleistocene glaciation. The Firth River is the only north-flowing river in the region bordered by spruce forest to within a few miles of the Arctic Ocean. The area includes a wide variety of habitat types, provides nesting areas for numerous bird species, and is used by most of the mammal species occurring on the refuge. The area is important for caribou migration, moose, brown bear, wolf, and wolverine, and supports one of the farthest north populations recorded for both beaver and muskrat in Alaska. The threatened arctic peregrine falcon is believed to nest in the area. Another regionally unique, important feature is the presence of tall limestone spires that add scenic beauty to the area. This area of the refuge is probably one of the most remote in terms of the amount of human visitation and use that occurs there. Bliss and Gustafson (1981) recommended the area as a national natural landmark, while Viereck and Zasada (1972) recommended it as an ecological reserve.
- o Peters and Schrader Lakes, known collectively as the Neruokpuk Lakes, lie on the north side of the Brooks Range. They are significant geologically and ecologically, and have "spectacular" scenic value. Peters Lake and Schrader Lake are the two largest and most northerly arctic alpine lakes in North America. The two large, deep, connected lakes are surrounded by steep slopes rising to some of the highest peaks in the Brooks Range. Significant geologic features besides the lakes in the area include: cirques, aretes, hanging glacial valleys, cirque glaciers, and surficial glacial deposits. The two lakes, situated between open tundra on the north and the Brooks Range on the south, provide an area of great ecological variety within a relatively small geographic area. Large and small mammals, including Dall sheep and caribou, as well as upland birds, are abundant. Resident lake trout, arctic char and arctic grayling are also present in the lakes. The lakes provide one of the few large convenient landing surfaces for fixed-wing aircraft in the northern mountainous portion of the refuge. Visitors to the area can view Dall sheep, caribou, wolves, bears, a variety of small mammals, and many species of birds. The lakes also provide fishing for lake trout, arctic char and arctic grayling. The area is also a subsistence use area. A field research station, formerly part of the Naval Arctic Research Laboratory, is located on the eastern shore of Peters Lake. This facility is now administered by and intermittently used by the Service. Numerous studies in limnology, mammalogy, botany, aquatic ecology, and geology have been conducted in the area. Peters and Schrader lakes were originally suggested as a national natural landmark by Dr. Frederick C. Dean of the University of Alaska, and a site evaluation report was prepared in 1968. Detterman identified it as a potential landmark in 1974. Bliss and Gustafson (1981) identified the site as having a high degree of national significance, and recommended it again as a national natural landmark. Finally, Gordon and Shaine (1978) listed it as one of the state's outstanding scenic complexes. In 1977, the Service designated the two lakes and surrounding area as the Neruokpuk Lakes Public Use Natural Area.

- o Porcupine Lake is one of the few large, high elevation lakes in the eastern Brooks Range. The area is significant for its abundant wildlife, including Dall sheep, moose, grizzly bear, wolf, fox, and caribou, as well as its limestone vegetation, and scenic beauty. Bliss and Gustafson (1981) identified the site as having a high degree of national significance, and recommended it as a national natural landmark.
- o The Sadlerochit Mountains and Warm Springs area is significant for its population of Dall sheep, its lush vegetation, its geology, and its warm water aquifer. The warm springs supports vegetation not generally found in the arctic lowland. The mountains support Dall sheep, the furthest north population in North America. Detterman (1974) noted the site was probably nationally significant, and recommended it for landmark status in 1974; Bliss & Gustafson (1981) also identified the site as having a high degree of national significance, and recommended it as a national natural landmark.
- o The Shublik Hot Spring and Canning Forest are significant for the hot springs, which supports lush vegetation (with several species extending beyond their usual range) and abundant wildlife. Shublik Springs is one of the largest continuously flowing springs on the north slope. The site is of considerable botanical interest because of the presence of relict flora of several types and disjunct populations of plant species not normally found north of the Yukon River. The site contains some of the best examples of tree growth on the north slope. Of particular note in this regard is a large grove of poplar trees. Erigeron muirii (Muir's fleabane), a candidate plant for threatened/endangered species listing, is found in this area. The warm spring has important fish overwintering values, supporting resident arctic char year-round. The spring and vegetation provide habitat for birds well north of their usual ranges, including the American robin, gray jay, yellow-shafted flicker, and possibly the northern three-toed woodpecker. The area supports one of the healthiest moose populations on the north slope of the refuge--moose congregate during the fall, winter and spring. Brown bear, caribou, wolverine and wolf are also common. Fossils are found in the rocks on Shublik Island. The Shublik Hot Spring and Canning Forest area has been recognized for its national significance in several studies, including: Viereck and Zasada (1972) who recommended it as an ecological reserve; Detterman (1974) who recommended it as a national natural landmark; Koranda and Evans (1975) who nominated it as a national natural landmark; and Bliss and Gustafson (1981) who noted it had high national significance and recommended it as a national natural landmark. The Service designated the Shublik Research Natural Area here in 1975.
- o The Upper Coleen River supports the northernmost stands of white spruce found in the Brooks Range. Abundant wildlife are present, including brown bear, moose, fox and wolverine. This site was first recommended as an ecological reserve by Viereck and Zasada (1972). Bliss and Gustafson (1981) subsequently noted that it appeared to have national significance, and recommended the site as a national natural landmark.

- o The Beaufort Lagoon-Icy Reef-Kongakut River area has several noteworthy features. Detterman (1974) noted it as "an excellent offshore bar and lagoonal system in the Arctic lowland....An exceptional[ly] good site to study coastal depositional features...." He stated the area was "definitely eligible for entry into the Registry of Natural Landmarks." Koranda and Evans (1975) noted the area "...contains several unique landscape and ecological features which are representative of the northeastern section of the Arctic Lowland." Icy Reef encloses a large lagoon that provides habitat for large populations of whitefish and arctic char; marine invertebrate organisms are also abundant. The lagoon is a feeding and resting area for waterfowl, including black brant, surf scoter, oldsquaw, arctic loon, and many shorebird species. Ringed and bearded seals also use the lagoon. Other wildlife species found in the area include snow goose, tundra swan, Canada and white-fronted goose, common and king eider, caribou, muskox, wolf, arctic fox, brown bear, peregrine falcon and gyrfalcon. Gordon and Shaine (1978) recognized the Beaufort Lagoon-Icy Reef site as one of the state's outstanding scenic complexes. Koranda and Evans (1975) also included the lower part of the Kongakut River as another area worthy of designation as a national natural landmark.
- o Old John Lake is a large lake on the southern flanks of the Brooks Range. It is significant for its abundance of wildlife. Large mammals, including moose and caribou, are abundant at certain times of the year. Large lake trout attract subsistence and sport fishermen. The site also is important historically with evidence of past Eskimo habitation. Bliss and Gustafson (1981) noted the area appeared to be of national significance and recommended it as a national natural landmark.
- o The Echooka River includes an aufeis field formed by springs. The area around the springs contains a wide variety of plants and is the site of some of the largest trees on the north slope. The lush vegetation also attracts numerous birds and mammals. Detterman (1974) stated the site was probably of national significance, and recommended it as a national natural landmark. The abrupt mountain front in the Echooka-Ivishak area is among the most striking in the Brooks Range. The site was considered as an ecological landmark and was suggested as an ecological reserve by the Joint Federal-State Land Use Planning Commission. Koranda and Evans (1975) also recommended the site as a national natural landmark, because of its unique botanical nature, while Gordon and Shaine (1978) identified it as one of the state's outstanding scenic complexes.

Geological/Paleontological Values

The Arctic Refuge has many sites with special geological and paleontological values. Peters and Schrader lakes, Sadlerochit Mountains and Warm Springs, and the Beaufort Lagoon-Icy Reef-Kongakut River area have geological value, as noted above. Other sites that have been identified to have special geological and paleontological values in the refuge include the following:

- o The ramparts of the Porcupine River is of both geologic and scenic interest. The main river and the lower ends of its tributaries have formed a series of narrow colorful gorges. The gorges contain numerous caves and fossils. It also provides breeding habitat for the endangered American peregrine falcon subspecies, as well as golden eagles. Young and Walters (1982) highly recommended it as a national natural landmark. The area is also recognized as one of the state's outstanding scenic complexes (Gordon and Shaine, 1978).
- o Atigun Canyon is significant as a geologic and scenic feature. The chasm is as much as 2,000 feet (600 m) deep and eight miles (13 km) in length, exposing multi-layered, contorted rock strata. The canyon supports abundant wildlife, including brown bear, caribou, Dall sheep, moose, and wolf, and is a breeding ground for raptors and other tundra breeding birds. Both Bliss and Gustafson (1981) and Detterman (1974) recommended the site as a national natural landmark. The Joint Federal-State Land Use Planning Commission recommended it as an ecological reserve, while Gordon and Shaine (1978) identified it as one of the state's outstanding scenic complexes.
- o The Okpilak River valley is significant for its diverse glacial features and scenic beauty: among the major valleys in the area, the Okpilak contains the largest amount of glacial features including moraines, fans, kames, sand dunes, and outwashes. Exceptionally rugged glaciated mountains closely fringe the river. This valley was identified as having a high degree of national significance and was recommended as a national natural landmark by Bliss and Gustafson (1981). Gordon and Shaine (1978) also identified it as one of the state's outstanding scenic complexes.
- o The Ignek Mesa commands a "spectacular" view of multicolored strata in Ignek Valley as well as the surrounding Shublik and Sadlerochit mountains. It contains some of the richest fossil collecting areas in northern Alaska with a complete record for the Upper Triassic, Jurassic, and Lower Cretaceous--nearly 100 million years of the earth's history can be viewed in this one small site. An important sheep lick is also on this site. Detterman (1974) stated the site is of national significance and qualifies as a national natural landmark; Gordon and Shaine (1978) also identified it as one of the state's outstanding scenic complexes.
- o Detterman (1974) noted that Fire Creek is "one of the most outstanding sites" on the north slope, and of "great national significance." The creek has cut a narrow gorge through the rock, completely exposing some of the most fossiliferous strata found anywhere. A complete record of the development of life from the middle Mississippian to the middle Jurassic, an interval of about 175 million years, are contained in these rocks. The gorge is very scenic. Detterman further stated that information concerning the abundant fossils at this site should not be given wide distribution because indiscriminate collecting could ruin the site.

- o Ignek Creek contains a vertebrate fossil site in limestone of the Triassic Shublik Formation. Fossiliferous strata of Mississippian to Jurassic age are nearby. Ignek Valley is a main caribou migration route. Detterman (1974) recommended the area be preserved for future scientific investigation and be included in the Registry of Natural Landmarks. The valley was also identified by Gordon and Shaine (1978) as one of the state's outstanding scenic complexes.

Scenic/Recreational Values

The Arctic Refuge has often been singled out for its special scenic and recreational values. The refuge encompasses part of the 600-mile (970-km) long Brooks Range, the northernmost extension of the main continental mountain system of North America. The four tallest peaks in the Brooks Range, Mounts Isto, Chamberlin, Hubley, and Michelson, are located in the refuge. The Arctic Refuge also contains the only extensive glaciation in the Brooks Range. The dramatic scenic qualities and the remoteness of these mountains attract backpackers, photographers and hunters from around the world.

The refuge has three national wild rivers, the upper Sheenjek, Ivishak and Wind rivers. These rivers were designated by Congress in Section 602 of the Alaska Lands Act because of their high scenic, recreational, and wildlife values. Other rivers with high recreational values in the refuge include the Canning, Kongakut, Hulahula, and the East Fork of the Chandalar.

Most of the sites listed under other values in this chapter also have been identified to have special scenic values, including:

- o Peters/Schrader Lakes
- o Porcupine Lake
- o Sadlerochit Mountains and Warm Spring
- o Beaufort Lagoon-Icy Reef-Kongakut River
- o Firth River/Mancha Creek Research Natural Area
- o Echooka River
- o Okpilak River valley
- o Ignek Creek
- o Ramparts of the Porcupine River
- o Atigun Canyon
- o Ignek Mesa

IV. AFFECTED ENVIRONMENT

IV. THE AFFECTED ENVIRONMENT

SETTING

The Arctic Refuge is situated in northeast Alaska. The eastern boundary is the Canadian border; the northern boundary is the Beaufort Sea coast and the seaward shore of the barrier island system. Total area within the boundaries of the refuge is about 19.5 million acres (7.9 million ha). From east to west the refuge extends a maximum of about 210 miles (340 km) from the Canadian border to the Atigun River at the extreme western end. In the north-south direction the refuge extends a maximum of about 190 miles (310 km) between the Beaufort Sea coast and the Keele Mountain Range south of the Porcupine River (see Figure 2).

LAND STATUS

Table 4 summarizes the land status of the Arctic Refuge as of June 1986; Figure 5 shows the status of lands within the refuge boundary. Of the approximately 19.5 million acres (7.9 million ha) within the refuge boundary, about 99% of the land (19 million acres) is presently under federal jurisdiction. About 1% of the land has either been selected by Native corporations, or has been filed for Native allotments.

Approximately 176,000 acres (71,000 ha) of refuge lands have been conveyed to Native village and regional corporations under provisions of the Alaska Native Claims Settlement Act and the Alaska Lands Act; another 5,000 acres (2,000 ha) have been selected by the Kaktovik Inupiat Corporation. Under the terms of the Chandler Lake land exchange agreement, the Arctic Slope Regional Corporation (ASRC) owns all subsurface rights to the Kaktovik Inupiat Corporation lands. Doyon Ltd, a regional Native corporation, has selected 112,000 acres (45,000 ha) in the southern part of the refuge under Section 14 of the Alaska Native Claims Settlement Act.

Section 22(g) of the Native Claims Act applies to all lands conveyed to Native corporations from within the original Arctic National Wildlife Range. This section states that the refuge lands conveyed to the Native corporations remain subject to the laws and regulations governing use and development of the refuge.

About 173 applications have been filed for Native allotments in the Arctic Refuge, totaling about 15,000 acres (6,100 ha). Of these, approximately 4 have been patented or approved; the remainder are still being reviewed. The allotment applications are primarily along the coast and on stream drainages near Arctic Village.

Approximately 1,000 acres (400 ha) within the refuge boundary are under other private ownership, excluding Native allotments.

The United States and the State of Alaska dispute ownership of the submerged lands beneath the coastal lagoons in the area between the mainland and the offshore barrier islands from Brownlow Point to the mouth of the Aichilik River (with the exception of lagoons north of the Kaktovik Inupiat Corporation lands). Arguments over the ownership of these lands have been presented

Table 4. Land status of Arctic Refuge as of June 1986.^{a/}

<u>Ownership</u>	<u>Acres</u>	<u>% of Refuge</u>
Federal	19,196,000	99
<u>Native Village Corporation</u>		
- Selections	5,000	< 1
- Conveyances ^{b/}	85,000	< 1
<u>Regional Corporations</u>		
- Selections	0	0
- Conveyances	91,000	< 1
- 14(h)(1) Selections ^{c/} (94)	106,000	< 1
- 14(h)(8) Selections (1)	6,000	< 1
<u>Native Allotments (173)</u>	15,000	< 1
<u>Private Parties^{d/}</u>	1,000	< 1
<u>Total Within Refuge Boundary</u>	<u>19,500,000</u>	<u>100</u>

^{a/} Acreages are approximate due to rounding, inaccuracies in information available, and ongoing changes in the land status (e.g., relinquishments, invalidations and conveyances of selected land).

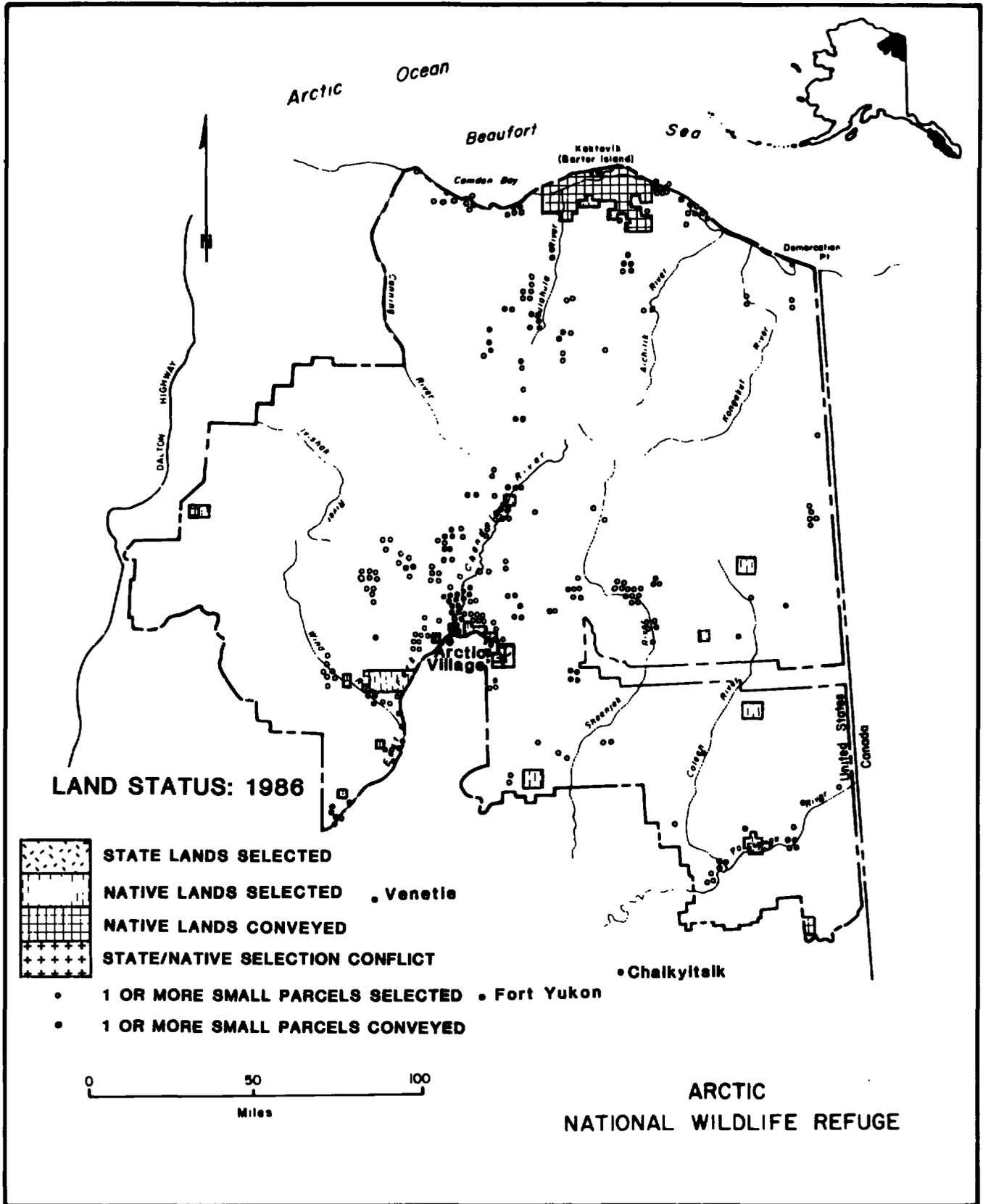
^{b/} Conveyances include interim conveyances and patented lands.

^{c/} Section 14(h)(1) selections are historic/cemetery sites that have been identified by the Doyon, Ltd. regional corporation

^{d/} Private inholdings include homestead sites, mission sites, Native townsites, and headquarter sites.

Source: Realty Division, U.S. Fish and Wildlife Service, Anchorage, AK.

Figure 5. Land status as of June, 1986.



to a Special Master appointed by the United States Supreme Court. A final decision has not been rendered. Until this decision is made, all activity on these submerged lands requires concurrent federal and state approval.

PHYSICAL ENVIRONMENT

Climate

The Arctic Refuge encompasses a range of climatic conditions that occur from the coastal plain environment along the Beaufort Sea southward across the Brooks Range and into the interior Yukon Flats basin.

The climate of Alaska north of the Brooks Range is classified as arctic. Summers are short, cool and generally cloudy, with temperatures of the warmest month (July) averaging about 41°F (5°C) and maximum temperatures rarely exceeding 86°F (30°C). Subfreezing temperatures and snow may occur at any time during the year. Winters are very cold, with temperatures of the coldest month (February) averaging about -4°F (-20°C). Extreme lows frequently drop below -40°F (-40°C). Because high surface winds are common throughout the year, the combination of wind and temperature results in equivalent chill temperatures well below the actual temperatures.

Within the arctic zone, there is a trend toward increasing continental and diminishing marine influence with distance from the coast. The arctic coast experiences more frequent cloudiness and fog, with higher winds, while inland, clear skies are more common and winds are variable. Thus, temperature ranges and extremes tend to be greater inland.

The arctic coastal plain receives little precipitation: the average annual water equivalent precipitation is less than 10 inches (25 cm). This includes 12 to 47 inches (30 to 120 cm) of snowfall. Most precipitation is in the form of summer rainfall. However, due to low evaporation rates, permafrost, and generally level terrain, soils in summer are usually saturated. Thus, available moisture is considerably greater than the low annual precipitation would produce in a more temperate climate.

Relatively high surface winds prevail along the arctic coast throughout the year. At Barter Island, a calm condition exists only 4% of the time. Average wind speeds are generally 9 to 15 miles per hour (15 to 25 kph), with occasional intense storms generating winds in excess of 70 miles per hour (115 kph). The winds are predominantly from the northeast, although most of the strongest winds are westerly.

The climate south of the Brooks Range can be characterized as continental subarctic, characterized by great seasonal extremes of temperature. Fort Yukon, the closest official weather recording station, situated about 60 miles (100 km) south of the southern boundary of the refuge, holds the state record high temperature of 100°F (38°C) and comes close to the record low of -75°F (-59°C).

Because the refuge is completely north of the Arctic Circle, all of the area experiences days when the sun is continuously above or below the horizon. This effect is accentuated in the more northerly portions of the area. At Barter Island the sun is continuously above the horizon-between May 15 and July 27. It is continuously below the horizon from November 24 to January 17. During this time, twilight and moonlight are the only sources of natural light. Twilight lasts for only 6-7 hours in late November and is reduced to a minimum of about three hours by December 21, the winter solstice.

Air Quality

Data on air quality of the Arctic Refuge have not been collected. However, because human activity is low, air quality in the refuge is expected to be generally very good, with ambient concentrations for air pollutants nearly at background levels. Current air pollutant concentrations are expected to result from a combination of natural sources and the residue of arctic haze. In recent years arctic haze has been reported over the north slope. This haze, which probably extends to the refuge, may result from pollutants emitted from the Soviet Union (Rahn and Lowenthal, 1984). Particulate matter can occur at high concentrations even in remote areas and in the absence of human activity due to windblown dust, soil, or other surface cover.

Air quality in the refuge is strongly dependent on local meteorological conditions and topography. Strong temperature inversions, particularly during the winter, often begin near ground level and hinder vertical air circulation and mixing. An inversion, if coupled with low, near-surface wind speeds, can produce prolonged stagnant air conditions, especially in areas having topographic obstructions such as hills and mountains.

Noise

Ambient noise levels over most of the Arctic Refuge are low and result predominantly from natural sources or processes. During the winter, the principal sounds are those associated with the wind. Noise carries considerable distances (but not upwind), especially during calm, cold (-40°F or -40°C) conditions because of the increased air density. Man-made sounds are confined to village activities and to some isolated activities, such as hunting. Other man-made sources are aircraft, vehicle and equipment operations.

Topography

There are three distinct physiographic units within the Arctic Refuge. The extreme northern portion of the refuge is the arctic coastal plain, a region of low to moderate relief that varies from a few to approximately 40 miles (60 km) in width. The Brooks Range, topographically the continuation of the North American Rocky Mountain System, occupies most of the refuge area. The southeastern portion of the refuge lies across the Porcupine Plateau, a broad upland of generally moderate relief.

On the north slope the coastal plain rises gradually from the sea bed, across very flat delta portions at the river mouths, then through scattered low hills to an altitude of about 600 feet (180 m). Many braided rivers cross the plain. Foothills above 600 feet are elongate east-west, revealing bedrock structure.

The Brooks Range consists of a wide belt of mountain ridges that arc gently east to west across the refuge. The long, central, northeast-trending crest of the Philip Smith Mountains forms the continental drainage divide where the range enters the refuge from the southwest. In the northcentral portion of the refuge, where the ridge bends east and southeast, the highest peaks of the Franklin, Romanzof, and British Mountains jut up abruptly at the north front of the range. Farther east, the continental divide becomes progressively lower, trending southeastward along the Davidson Mountains. In Canada the divide joins topographically well-defined portions of the Rocky Mountains.

Topography throughout the Brooks Range is rugged, reflecting glaciation and differential erosion of tilted, folded, and faulted rock layers. The ridges strike parallel to the rock layers and to the mountain ranges. Intervening valleys are wide, steep-sided and flat-floored, cut by glaciers and then filled with alluvium. Mountain summits are generally from 4,000 to 6,000 feet (1,200 to 1,800 m) in the Philip Smith Mountains, 7,000 to 8,000 feet (2,100 to 2,400 m) in the Franklin Mountains, and 8,000 to 9,000 feet (2,400 to 2,700 m) in the Romanzof Mountains. The four highest peaks in the Brooks Range are within the Romanzof Mountains in the refuge, the highest being 9,050-foot (2,760 m) Mount Isto. Scattered ice caps and alpine glaciers remain above 6,000 feet (1,800 m), most numerous and longest (about 8 miles or 13 km) in the Franklin Mountains-Romanzof Mountains sector.

The Porcupine Plateau is a rolling upland with rounded to flat summits mostly 1,500 to 2,500 feet (460 to 760 m) in elevation. Several domes and mountain groups rise higher; for example, Helmet, Shoulder, and Spike mountains rise 3,300 to 3,700 feet (1,000 to 1,100 m). Drainage is irregular, with no recognized pattern or preferred direction.

Geology^{a/}

The Arctic Refuge is an approximately 30,000 square mile (78,000 km²) region that cuts across the entire Brooks Range, encompassing various geologic terranes and subterranes that are defined by distinctly different bedrock and surficial deposit lithologies, stratigraphy and structure. Rocks in the region have been multiply metamorphosed or deformed with an intensity that varies throughout the refuge. These variations in lithology, stratigraphy, structure, and degree of deformation result in complex geologic relationships.

^{a/}Most of the information in this section, including the descriptions of bedrock geology, surficial geology, soils, mineral potential and oil and gas potential, was taken from an unpublished report on the refuge prepared by the Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, Fairbanks. This report includes a detailed description of the refuge's bedrock geology and a preliminary geologic map. Copies of the report are on file at the refuge's headquarters in Fairbanks and the Service's regional office in Anchorage.

Bedrock Geology

Rocks of the Brooks Range and Porcupine Plateau within the refuge range in age from Quaternary to Proterozoic. Metamorphic grade ranges from completely unmetamorphosed rocks to gneiss and schist of the amphibolite facies that may have been metamorphosed three times.

The Arctic Refuge is composed of fragmented continental crust overlain by oceanic crust. The adjoining small continental crustal fragments are called lithostratigraphic terranes; large subdivisions of terranes are called subterranes. Terranes and subterranes delimit areas with distinctly different geologic history and consequently different geological environments from adjoining terranes. Most terranes and many subterranes are separated by major faults, which accounts for the contrasting geologic histories.

The Cordilleran Orogenic Belt, which the Arctic Refuge transects, is composed of numerous lithostratigraphic terranes (Silberling and Jones, 1984). The oceanic Angayucham, and continental Arctic Alaska and Porcupine lithostratigraphic terranes occur in the refuge. These terranes are further subdivided into eight subterranes. The structurally highest lithostratigraphic terrane, the Angayucham terrane, is divided into three subterranes. The Arctic Alaska terrane, which underlies about 80% of the refuge, is structurally and stratigraphically complex: the terrane is divided into four subterranes and three stratigraphic sequences with important stratigraphic and lithologic differences respectively. Similar stratigraphic sequences are described in the Porcupine terrane, which may be a continuation of the North Slope subterrane of the Arctic Alaska terrane.

Because shallowly inclined thrust faults are the primary terrane and subterrane bounding structures the structural style of the refuge can be viewed simply as a stack of thrust fault-bounded, panel-shaped subterranes. The oceanic Angayucham terrane lies on top and is composed of three subterranes in descending order: a panel of ultramafic and mafic rocks derived from oceanic lower crust and mantle; a panel of mafic volcanic rocks derived from oceanic upper crust; and a panel of phyllite derived from supracrustal slope-rise sediments. The underlying continental rocks of the Arctic Alaska terrane are divided into four subterranes in sequence from top to bottom: the Coldfoot, Hammond, Endicott, and North Slope subterranes. Northward-vergent, south-dipping thrust faults separate these terranes and subterranes, so the present sequence from top to bottom was, prior to thrusting, a sequence from deepest and south-most to highest and north-most. The vertical stacking order of subterranes remains relatively constant across arctic Alaska.

The Angayucham terrane is exposed in the south-central portion of the refuge between Arctic Village and Vundik Lake where it was originally called the Christian Complex (Brosge and Reiser, 1962). It is composed principally of pillow basalt, tuff, gabbro, diabase, chert, graywacke, and phyllite, and minor limestone with an overlying thrust sheet of serpentized peridotite. The Angayucham terrane underlies a large part of northern Alaska south of the Brooks Range and is correlated with ophiolitic klippe in the northeastern Brooks Range (Roederer and Mull, 1978) and the Innoko and Tozitna terranes and Rampart Group of the southern Yukon and Koyukuk basin (Roederer and Mull, 1978; Jones et al., 1984).

The Arctic Alaska terrane underlies the Brooks Range to the north of the Porcupine River, where it is bounded by the Angayucham thrust. Within the refuge, the Arctic Alaska terrane extends from the Angayucham thrust near Grayling Lake north to the Arctic Ocean, and is composed primarily of continental sedimentary and metasedimentary rocks of Proterozoic through Mesozoic age, with especially thick and varied Devonian rocks. From south to north, Silberling and Jones (1984) divided the Arctic Alaska terrane in the refuge into the Coldfoot, Hammond, Endicott, and North Slope subterrane. The subterrane are south-dipping, tabular to lenticular thrust panels or allochthons separated by major thrust faults whose south to north distribution is a result of vertical top to bottom stacking of the subterrane.

Each of the subterrane have internally consistent, distinctive Paleozoic stratigraphies but share elements of the regional Paleozoic stratigraphy of the Arctic Alaska terrane. Significant geologic units that reoccur in most of the subterrane are the Devonian volcanic units and granites, the Hunt Fork Shale, and the Endicott and Lisburne Groups. Their distribution seems to preclude post-Lisburne plate boundaries within the Arctic Alaska terrane.

The Porcupine terrane underlies the southeastern portion of the refuge to the south of the Porcupine River. Very little has been published about the geology of the Porcupine terrane, and exposures there are poor compared to the Brooks Range, making mapping more difficult. The stratigraphy and general geologic history of the terrane are similar to that of the North Slope subterrane of the Arctic Alaska terrane. The generalized stratigraphy of the Porcupine terrane is: 1) a Proterozoic sequence of phyllite; 2) an unconformably overlying Lower Paleozoic, Franklinian sequence of carbonate rocks; 3) an unconformably overlying Upper Paleozoic and Lower Mesozoic Ellesmerian sequence siliceous clastic rocks; an unconformably overlying Late Cretaceous, Brookian sequence of quartzitic sandstone; and an unconformably overlapping sequence of Miocene to Pleistocene clay and basalt.

Surficial Deposits and Glacial Geology

Six Quaternary (Pleistocene and Holocene) glaciations occurred in the Arctic Refuge. Glaciers were of an alpine valley type that during the earlier, more extensive Latest Tertiary-Pleistocene advances coalesced to form piedmont lobes. However, the glaciers of northern Alaska never formed a continuous ice-sheet.

The two oldest advances, the Anaktuvuk and Sagavanirktok glaciations, are pre-Wisconsinian in age. Deposits of these glaciations are greatly modified by erosion and mass-weathering. Drift is present as tundra-covered moraines. Most of the former kettle lakes have been filled or drained and drainage patterns are well integrated. Relatively fresh drift deposits of the early Wisconsinian age Itkillik and Echooka glaciations are distinguished by differences in physical characteristics and the distribution of morainal areas.

Deposits of the late Wisconsinian(?) Alapah Mountain glaciation are little modified by weathering, but are tundra-covered. Morainal areas contain kettle lakes and consequent drainage has undergone little or no modification.

The Holocene Fan Mountain glaciation represents the most recent glacial advance recorded in the region. Fan Mountain moraines are fresh, bare of tundra and generally restricted to the cirque areas.

Most existing glaciers on the northern slope of the Brooks Range originate in the protected parts of the larger, higher, north-facing cirques and most do not extend more than 3 or 4 miles (5 or 6 km) from the areas of accumulation. The smaller glaciers seem to be remnants of shrinking Quaternary valley glaciers. Almost all the smaller cirques at lower levels are ice-free.

Surficial deposits of the Arctic Refuge include Quaternary and Recent deposits of glacial, alluvial, eolian and colluvial sediments; glacial deposits predominate (Karlstrom et al., 1964). Although at least six glacial advances occurred in the refuge, glaciers apparently never advanced more than a few miles beyond the present mountain front. Morainal deposits are concentrated in this area (Hartman, 1973). Wisconsin age moraine and drift deposits fill the upper valleys of most drainages, while farther down in these drainages Illinoian modified moraine and drift occur. Still farther downstream older, highly modified moraine and drift deposits are predominantly exposed in the middle reaches of many of the south slope drainages and in a large area of the lower Canning River on the north slope. Outwash bordering older moraines is found over an extensive area of the central arctic coastal plain and in the upper Tamayariak and Katakaturuk drainages.

The Canning River delta contains the only extensive modern deltaic-sediment deposits in the refuge. Most of the lower coastal plain is composed of older interstratified alluvial and marine sediments locally including glacial till.

Modern alluvial floodplain deposits underlie the active floodplains of the major rivers of the north and south slopes. Older alluvial fan deposits are found in the upper Katakaturuk, Marsh Creek and Sadlerochit drainages on the coastal plain. Eolian (wind blown) deposits are found in a few interfluvial areas of the northeastern coastal plain and in the southeastern-most portion of the refuge, to the south of the Porcupine River.

Much bare bedrock and coarse rubble is exposed over extensive portions of the Porcupine Plateau and over the majority of the Brooks Range. The Porcupine Plateau area is mostly covered by coarse- and fine-grained colluvium. Undifferentiated eolian, glacial, colluvial and fluvial deposits underlie most of the Coleen and Porcupine river drainages and the upper portions of the Firth and Old Crow river drainages.

Permafrost

Permafrost underlies most of the Arctic Refuge. Permafrost is defined as soil, other superficial deposits, or even bedrock, in which the temperature is below freezing (32°F, 0°C) for at least two years continuously (Muller, 1947). Depth of permafrost on the north slope of the refuge is probably comparable to that in the western Alaskan north slope area, approximately 1,000 feet (300 m) (Brewer, 1955). The active layer, that portion of the ground surface that thaws annually in summer, ranges from less than 1 foot (0.3 m) to 5 feet (1.5 m) in thickness.

Lakes and rivers influence the permafrost depth. Shallow lakes freeze to the bottom and are directly underlain by permafrost. Deep lakes and the deeper portions of rivers (7+ feet deep) (2.1 m) usually do not freeze to the bottom and are underlain by a thaw bulb in the permafrost table (Brewer, 1958a,b).

Common topographic features on ground underlain by permafrost are low and high-centered polygons. These features form when the upper few feet of ground, exposed to temperatures well below freezing, contract and crack, usually in polygonal patterns. Spring meltwater seeps into these cracks, which when the water freezes again leaves vertical stringers of ice. This ice limits summer expansion of warming permafrost, displacing the adjacent mineral soils upward. The repeated cracking and widening of these vertical ice wedges over many years results in elevated ridges of soil material forming on either side of the wedges (Lachenbruch et al., 1962).

The polygonal areas formed between these interconnecting ice wedges are usually from 30 to 200 feet in diameter. Most polygons are of the low-centered type, characterized at the ice wedge boundaries by upthrust ridges that impede drainage from the polygon, giving the enclosed area a rice-paddy appearance.

In areas where there is enough slope to allow drainage, such as near streams, lakes and the coast, high-centered polygons may occur. These polygons originate in the same manner as low-centered polygons, but during exceptionally warm summers, with deeper thaw, the tops of the ice wedges melt. Water then drains off, and the soil and tundra slump into the voids. This slumping, when repeated over tens of years, produces ditches between the polygons, leaving the polygons separated by interconnecting, partially filled voids.

Soils

The coastal plain region of the refuge includes low terraces and floodplains of streams draining the north slope of the Brooks Range. Materials underlying the soils consist of fluvial sands and silts from these streams with increasing amounts of interstratified marine sediments near the coast. Generally, soils of the plain are poorly drained, thawing less than 18 inches (46 cm) in summer. Loamy textures are common on terraces and floodplains, and organic soils occur in depressions. Locally, peaty materials are buried beneath windblown sand deposits.

Soils in the rolling foothills area to the south of the plain form on a variety of parent materials, ranging from very gravelly deposits on ridges and upper slopes to medium- and fine-grained materials in lower areas. Most soils of the long foothill slopes and broad valleys of the foothills are poorly drained and form from silty and clayey materials. Well-drained, very gravelly soils with dark non-acid to slightly acid upper layers occur locally. Peaty soils are found in valley bottoms; sandy soils including windblown silt occur in isolated dunes bordering major streams. Shallow permafrost in the foothills is evidenced by widespread ice-related surface features. Foothills vegetation is important because it stabilizes the thin, highly erodible soils above the shallow permafrost layer. The Brooks Range consists mainly of very steep,

exposed bedrock and coarse rubble surrounding alpine valleys and less sloping areas with shallow, very gravelly and stony soils. Steeper terrane has fewer isolated bodies of gravelly and stony soils.

Gravelly glacial till underlies large valleys while outwash deposits extend from the mouths of these valleys down into the foothills. Vegetation is sparse and vascular plants do not occur above 3,000 feet (900 m).

Soil types south of the Brooks Range vary considerably. Wet loamy soils with a thick overlying peat layer and a shallow permafrost table are common in the broad lowlands adjacent to the Yukon River and its major tributaries. Peat deposits are found locally in these soils.

Upland sites have better-drained soils. Hills and ridges of the southern slopes of the Brooks Range, Yukon-Tanana Uplands, and Porcupine Plateau are underlain by well-drained brown loams. Hillsides, slopes, and ridges bordering the Yukon Flats are underlain by moderately well-drained gravelly and stony loams.

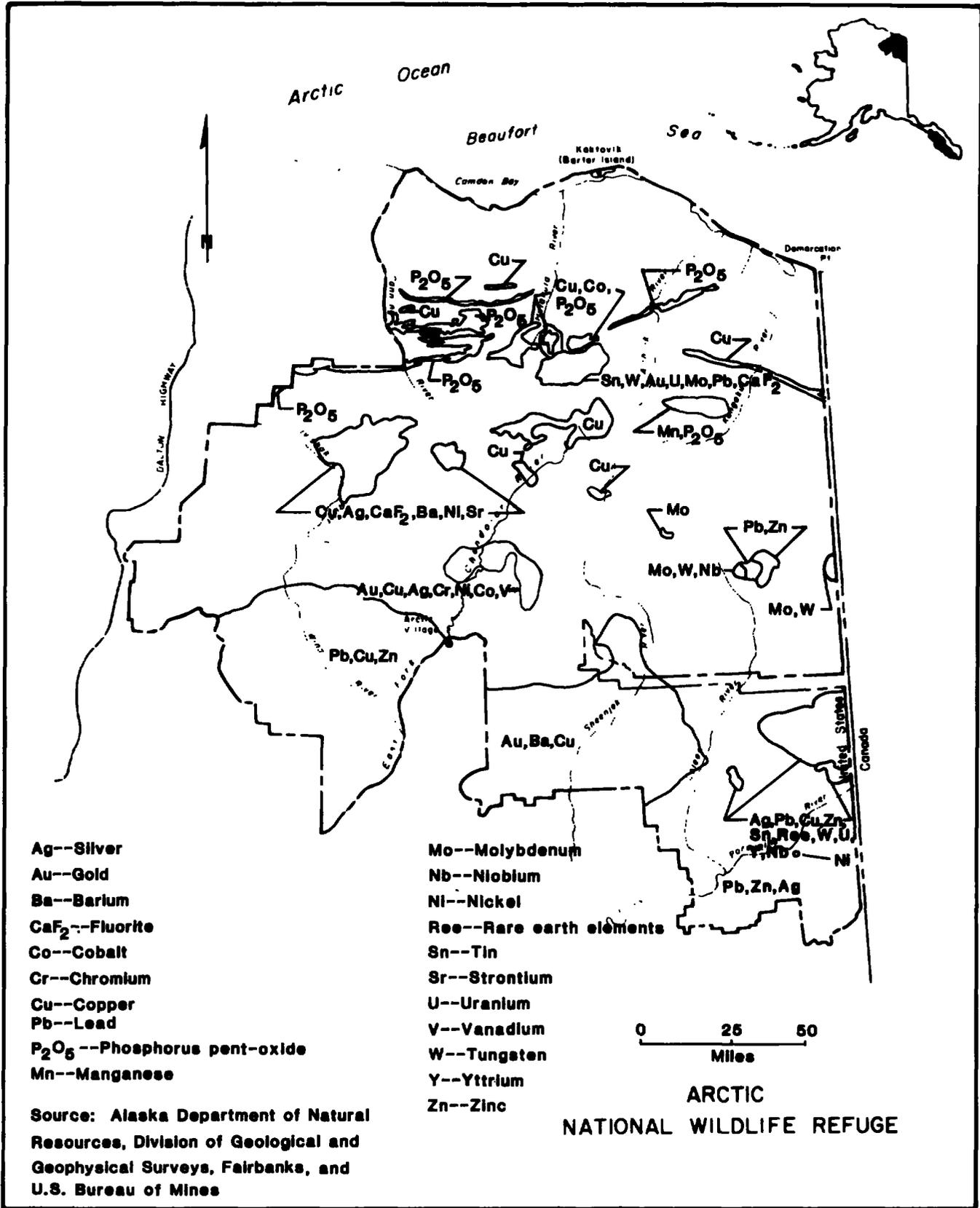
Three major soil orders, Inceptisols, Entisols and Mollisols, and 14 soil associations have been identified on the Arctic Refuge. Appendix N briefly describes these soil types and identifies where they occur in the refuge.

Mineral Resources

Previous efforts to define the metallic and selected nonmetallic mineral resources of the refuge have resulted in several informative maps, descriptions, and predictions of mineral occurrences. Mineral occurrences provide site-specific information on the mineral potential of the refuge. Presently the refuge is poorly explored so only a few deposits or occurrences are known (Figure 6). Consequently, the areas with high potential for mineral deposits cannot be outlined directly from mineral occurrence information and must be delineated instead by lithologic unit.

The deposition of many of the mineral occurrences in the refuge are genetically linked to geologic processes that formed the associated lithologic unit. Thus, a given lithologic unit or formation may have regional, genetic potential for certain deposit types wherever it is exposed. Each lithostratigraphic terrane has a unique sequence of lithologic units throughout and provides a convenient framework for describing areas with mineral potential. However, some lithologic units occur in two or more of the subterranees of the Arctic Alaska terrane; for brevity, the regional, genetic mineral potential of these units is described only once. The following is a brief description of deposit types that may be found in the lithostratigraphic terranes and subterranees in the refuge.

Figure 6. Mineral occurrences and potential mineral sources in the Arctic Refuge.



Arctic Alaska Terrane -

(1) North Slope Subterrane:

Precambrian to lower Paleozoic sedimentary and volcanic rocks (including the Neruokpuk Formation): Local potential copper deposits based on occurrences of native copper and copper sulfides may be found as amygdules and vein fillings in Precambrian to lower Paleozoic volcanic rocks in the Sadlerochit and Shublik mountains. Numerous occurrences of malachite and azurite found in the volcanic rocks along with copper enriched stream sediment samples from the mineralized areas is evidence these areas may contain copper deposits.

Okpilak Batholith: Several styles of mineralization and geochemical signatures are found within the granite rocks of the Okpilak Pluton and adjacent outcrops of Precambrian to lower Paleozoic rocks including the Neruokpuk Quartzite (Sable, 1977). These include:

1. Skarn deposits anomalous in tin, tungsten, lead, and zinc found in the vicinity of the Esetuk glacier and Kolotuk Creek (Sable, 1977 and unpub. data from the Alaska DNR-Div. of Geol. & Geophysical Surveys).
2. Greisen deposits characterized by veinlets, pods, and disseminations of tourmaline, fluorite, and quartz within larger fractures and shear zones developed in the granite. Rock samples are moderate enriched in tin. Associated stream sediment and pan concentrate samples anomalous in tin and cassiterite bearing clasts occur in the nonconformably overlying Kekiktuk Conglomerate.
3. Sparse molybdenum mineralization found disseminated in granite.
4. Higher than average concentrations of uranium have been found in stream sediment samples draining the batholith and may indicate potential for uranium resources.
5. Favorable potential for gold mineralization is indicated by a few reported stream sediment samples anomalous in gold and arsenic and also by historical development at a gold placer claim on the south side of the batholith (Brosge and Reiser, 1976).

Old Crow Batholith: Unidentifiable uranium minerals (possibly clarkeite and eschynite) found in stream gravels that drain the Old Crow Batholith. Hypabyssal rhyolite intrusions along the shallowly eroded south side of the batholith may contain epithermal mineral deposits. The batholith is host to uranium lodes and tin-rare earth elements-ytterbium-tungsten-molybdenum placers. Copper-zinc-silver skarns also occur, and tin greisens are likely (Hoekzema, pers. com.).

Beaucoup Formation: Previously unassigned Devonian metasedimentary rocks are provisionally assigned to the Beaucoup Formation. They may have felsic volcanic interlayers, particularly in exposures near the Okpilak Batholith, and therefore have unevaluated potential for copper massive sulfide deposits.

Endicott Group: Heavy minerals including cassiterite, pyrite, ilmenite, tourmaline, zircon, fluorite, scheelite, and sphene are found in sediments that constitute the Kekiktuk Conglomerate and Kayak Shale. These minerals suggest that the source for some of the sediments is the region occupied by the (mineralized) Okpilak Batholith. The deeply incised nature of the drainage system in the vicinity of the Okpilak Batholith has resulted in deep erosion of the mineralized area. Proper concentration of the heavy minerals through sedimentary processes could have produced paleo-placer deposits (Dillon and Bakke, 1987; Brosge and Reiser, 1976; Sable, 1977; and Reed, 1968). Locally the Kekiktuk Conglomerate contains thin and discontinuous layers of anthracite.

Lisburne Group: The occurrence of sulfate minerals of economic interest, celestite (SrSO_4) and barite (BaSO_4), in the subsurface of the Lisburne Group is believed to represent sabkha depositional environment (Wood and Armstrong, 1975). A similar depositional environment has been recorded in the Sadlerochit Mountains (Clough and Bakke, 1986). A broad regional stream sediment anomaly defined by high values in strontium, copper, nickel, barium, and tungsten, is present in the region surrounding Porcupine Lake and perhaps indicates a large distribution of supratidal facies in this region (Barker, 1981). At Porcupine Lake, copper-oxides, silver sulfosalts, fluorite, and sphalerite occur in veins perhaps related to igneous activity. High arsenic, antimony and tin values are also found in grab samples from the Porcupine Lake area. Barker (1981) suggests evidence of basic to intermediate volcanism is shown by occurrence of tuffaceous limestones in the upper portion of the Lisburne Group.

Phosphatic horizons are first seen in the rock record associated with thin chert and shale intervals of the Lisburne Group in the central Brooks Range (Patton and Matzko, 1959). Sable (1977) reports similar characteristics and observed phosphate-type accumulations in the Alapah Formation in the Romanzof Mountains.

Sadlerochit Group: Pyritic horizons are common in the Ivishak and Echooka Formations of the Sadlerochit Group. Sandstone containing up to 70% pyrite and glauconite grains have been found in 20 to 30 foot (6 to 9 m) thick zones within the Echooka Formation at Marsh Creek (northeastern end of the Sadlerochit Mountains) and at Fire Creek (northern flank of the Shublik Mountains). Barker (1978) reports moderately high background values of zinc and barium are found in pyritic rock samples from the Sadlerochit Group.

Shublik Formation: Phosphatic rocks present in the Triassic Shublik Formation represent a potential mineral resource. Phosphate minerals collophane and carbonate fluorapatite are believed to be of diagenetic origin and are found as nodules and fossil fillings within shale, siltstone, and limestone of the Shublik Formation. Outcrops rich in phosphate accumulation typically display an efflorescent bloom (Tourtelot and TAILLEUR, 1971; Patton and Matzko, 1959). The phosphatic horizons also contain higher than average values of uranium, rare earth elements, copper, molybdenum, nickel, and vanadium (Brosge and Reiser, 1976).

Gypsum is reported to occur within the Shublik Formation along the Marsh Fork of the Canning River (Barker, 1981).

Kingak Shale: Aluminum sulfate salt accumulations can be found as white to yellow efflorescent coatings on outcrops of pyritic Kingak Shale. The salts are metalliferous and contain high values of rare earth elements, yttrium and ytterbium (Tourtelot and TAILLEUR, 1977; Sable, 1977).

Rounded to irregular nodules containing carbonate fluorapatite occur within shaly units (occasionally pyritic) of the Kingak Shale and indicate potential for phosphate resources (Sable, 1977, and Reed 1968).

The Kingak Shale also contains local concentrations of uranium. Brosge and Reiser (1976) suggest that the source for the uranium anomalies may be through reworking of uraniferous granite and sedimentary rocks in the vicinity of the Okpilak Batholith.

Black shales of the Kingak Shale are suggested to be the source of higher than average values of molybdenum and zinc found in stream sediment samples (Brosge and Reiser, 1976).

Cretaceous and Tertiary Rocks: Reported occurrences of manganese carbonate rich (up to 5% manganese) layers hosted in Lower Cretaceous nodular and pelletal siltstone of the Bathtub Basin (Grybeck, 1977). Potential also exists for phosphate and uranium deposits in this area within the Lower Cretaceous sediments (Brosge and Reiser, 1976).

(2) Endicott Subterrane:

The regional potential for lithologically controlled mineral deposits in the Kayak Shale, Lisburne Group, and Sadlerochit and Shublik Formations in the Endicott subterrane is similar to that described above for the North Slope subterrane.

Devonian Volcanic Rocks and Beaucoup Formation: Brosge and Reiser (1968) report the occurrence of quartz veins in volcanic rocks that contain 0.5% Copper and 0.15% lead in the vicinity of Double Mountain. These volcanic rocks and the associated sedimentary rocks are sufficiently similar in age, lithology, and genesis to those of the Ambler volcanics in the western Brooks Range, where over \$10 billion worth of copper reserves have been located, that the area has to be considered very favorable for copper massive sulfide deposits.

Hunt Fork Shale: Regionally, rock samples from the Hunt Fork shale contain high values of base metals, especially lead, zinc, copper and silver. Mineralization is likely to be strata-bound due to stratigraphic and/or structural trapping of low temperature metalliferous brines during formation (Dutro, 1977).

Kanayut Conglomerate: This conglomerate contains anthracite coal layers locally. It has unevaluated potential for sandstone copper massive sulfide deposits.

Bear Mountain Intrusives: Potential for molybdenum and tungsten resources is present as porphyry style mineralization at Bear Mountain where mineralized soil samples are underlain by shallow intrusive bodies. The mineralized zone at Bear Mountain may trend east into Canada (Barker and Swainbank, 1986). This deposit is likely the single largest tungsten resource in the United States (Hoekzema, pers. com.). Placer occurrences of tungsten and molybdenum also occur in the area.

Lead, zinc, silver, and minor copper mineralization is present in the vicinity of Bear Mountain where veins and numerous veinlets of galena and sphalerite are found in volcanic rocks and in contact zones between the volcanics and phyllite (Barker, 1978). There is also potential for tungsten and molybdenum at Ammerman Mountain to the east of Bear Mountain (Hoekzema, pers. com.).

(3) Hammond Subterrane:

Hunt Fork Shale: The regional mineral potential of this shale is described under the Endicott subterrane above.

Beaucoup Formation: In the upper Wild River drainage, zinc, lead, silver and copper mineralization is hosted in chert, limestone, and phyllite of the Beaucoup Formation and is believed to represent a volcanogenic massive sulfide (VMS) deposit. Consistent yields of anomalous base-metal values from stream-sediment, rock, and heavy-mineral sampling performed in the region supports the existence of mineralization (Detra, 1977; Cathrall et al., 1977).

(4) Coldfoot Subterrane:

Schist Belt: A small area of the schist of the Coldfoot terrane is present in the extreme southwestern part of the refuge. This area has not been mapped in detail so potential for mineralization is poorly known. However, schist of the Coldfoot subterrane host the massive sulfide rich Ambler volcanics in the "Schist Belt" of the central Brooks Range. So unevaluated potential for VMS base metal deposits exists in the Coldfoot terrane.

Angayucham Terrane -

(1) Ultramafic and Gabbro Subterrane:

The mineral potential of the Angayucham terrane is poorly known. Rare occurrences of chromite have been found in the ultramafic rocks and Barker (1981) reports a sample from a mineralized peridotite south of the refuge border that contains 4.5% chromium and 0.1 ppm platinum.

(2) Mafic Volcanic Subterrane:

Rock in this subterrane represent dismembered upper oceanic and therefore may host "Cyprus" type VMS deposits, which are rich in copper, zinc and gold. Barker (1981) reports the occurrence of a few copper, gold anomalies near the Coleen River. Potential also exists for stratiform massive sulfide deposits. Rock samples rich in barium and manganese are known to exist along the Koness River (Brosge and Reiser, 1976). Barker (1981) reports a

strong stream sediment geochemical signature for copper, zinc, cobalt, calcium, vanadium, and manganese at the headwaters of the Kones River.

(3) Phyllite Subterrane

Similar potential for stratiform bedded barite and manganese deposits exist in the phyllite subterrane.

Porcupine Terrane -

Nickel-bearing aluminum sulfate present in a seep on the bank of the Porcupine River is most likely derived from the Quaternary olivine basalt (Cobb, 1976).

Paleozoic carbonate rocks have unexplored potential for lead-zinc massive sulfide deposits.

Oil, Gas and Other Fossil Fuel Resource Potential

The Arctic Refuge may contain large deposits of coal, oil and gas. There are potentially extensive coal resources in the Coleen/Porcupine River area (Hoekzema, pers. com.).

Quantitative estimates of petroleum resource potential are available only for the highly prospective coastal plain of the refuge. Most of the rest of the refuge has no potential for oil and gas deposits but there are two areas that have low but non-negligible potential.

Quantitatively, the petroleum potential of the refuge in the northern Brooks Range immediately to the south of the coastal plain is low (Grantz and Mull, 1978). Most rocks in the Brooks Range have no oil potential because they have been heated to temperatures past the oil window and the hydrocarbons have been driven out of them (Brosge et al., 1981). The only part of the Brooks Range within the refuge that has not been heated past the oil window is near Galbraith Lake. To the southeast of the Brooks Range, Mesozoic sedimentary and Paleozoic carbonate rocks in the refuge on the Porcupine Plateau have very low petroleum potential.

Porcupine Plateau and Venetie Basin - The Porcupine Plateau has not been thoroughly explored for oil and gas, and interest by oil companies has not been great. Two dry wildcat wells were drilled in the southern part of the Porcupine Plateau. One of these is within the refuge. The other well was spudded 36 miles (58 km) to the south of the refuge in a Cretaceous formation that is not exposed in the southeastern corner of the refuge. The wells tested only the most promising prospects. The nearest oil production is from Paleozoic rocks in the Eagle Plains Basin, 78 miles (125 km) to the east in Canada. Further exploration is necessary to exhaustively test the oil potential of the Porcupine Plateau.

Precambrian phyllite is overlain by 2 to 3 miles (3 to 5 km) of Cambrian through Devonian limestones in the Porcupine terrane. These older rocks are unconformably overlain by Upper Paleozoic quartzose clastic rocks and Cretaceous conglomerate. Churkin and Brabb (1969), reporting on reservoir rock potential exposed in the 75 miles (121 km) to the south in the Kandik basin, estimated that Upper Paleozoic and Cretaceous siliceous clastic

formations equivalent to those on the refuge have variable, mostly low permeability and porosity; locally they found higher porosity and permeability in the Permian Step Conglomerate. Churkin and Brabb (1969) also reported that some Kandik basin Cambrian and Devonian carbonate rocks have good interstitial and fracture porosity. The distribution of source rocks on the rock is uncertain. Proterozoic rocks are slightly metamorphosed so any hydrocarbons that were in them have been baked out (Brabb, 1970).

Blodgett (1978) determined color alteration indexes (CAI) for condont elements from samples of the Devonian Salmon Trout Limestone taken within the refuge to indicate that the hydrocarbons had also been baked out of them. However, oil seeps were reported from Devonian limestone exposed in the refuge along the Porcupine River (Mertie, 1928). Churkin and Brabb (1969) reported that some of the Ordovician through Mississippian rocks of the Kandik Basin have good source rock potential. However, Brabb (1970) showed that the best Kandik basin source rocks, the Mississippian Calico Bluff's Formation and Ford Lake Shalre, are not preserved beneath the Permian unconformity in the refuge. Numerous northeast-trending, high-angle, Cretaceous, strike slip faults and possible pre-Cretaceous thrusts cut the Paleozoic rocks.

Structural traps within the faulted and deformed rocks in the Porcupine terrane are likely to be small (less than 200 million barrels). Evidence for high temperature conditions indicate that dry gas and condensate are more likely to be generated than oil (Heroux and Bertrand, 1979). Although exploration is incomplete, the uncertainty of the existence of source and reservoir rocks and the small size of the potential traps makes the petroleum potential low and the likelihood of finding economically recoverable hydrocarbons still lower. Given the probable presence of source and rocks of poor to moderate quality in the Porcupine terrane, state geologists summarily estimate that there is a 95% chance that at least one hydrocarbon accumulation larger than 500,000 barrels is present. However, given the complex structure and generally poor quality of the reservoir rock, there is only a 5% chance that a field greater than 50 million barrels is present. In addition, permeability of reservoir rocks are likely to be low and dry gas is likely to predominate over oil.

Hydrocarbon rich shales which are possible petroleum source rocks crop out at a few localities in the upper Christian River drainage several miles to the south of Arctic Village (Mertie, 1928; I. Tailleir, pers. comm.). The 'oil shales' are part of the Upper Paleozoic to lower Mesozoic Anagayucham phyllite subterrane which tectonically underlies the angayucham ophiolite and tectonically overlies the Arctic Alaska terrane. Metamorphic rocks in the Arctic Alaska terrane are economic basement.

The low-density, light brown oil shales occur locally as lenses and thin layers in Devonian plant-fossil-bearing, lithic graywacke units containing interlayers of chert, shale, and mafic volcanic rocks. The oil shales are 'tasminites,' an impure coal that is transitional to oil shale formed from embryotic plant or algal bodies. The tasminite is deformed into tight folds that have poorly developed axial plane cleavages. D. Wright reports (pers. comm.) that analyses of hydrocarbon content of the shale yielded values between 100 and 150 gallons per ton of shale. The shale ignites readily when lit with a match, but I. Tailleir (pers. com.) reports that temperature of

over 600°C are required to drive the oil out of it. The shale is considered to be a poor source rock because of its high thermal capacity and restricted distribution as thin local bodies.

The Devonian graywacke is the principal reservoir rock in the area. No porosity or permeability measurements of the graywacke have been published. Porosity and permeability are likely to be low because the rock contains a high lithic content composed in part of labile volcanic grains, and because of the combined effects of tectonic dismemberment and low-grade metamorphic alteration. The structure is also complex and structural traps are likely to be small. The only potential regional structural traps are fault sealed anticlines beneath the Angayucham ophiolite. Any hydrocarbons present are expected to be gas rich. The petroleum potential of the Venetie basin is low.

Galbraith Lake Area - This area encompasses the northwest corner of the refuge from the Marsh Fork of the Canning River to the Atigun River near Galbraith Lake along the Dalton Highway. Sparse rock paleothermometry from the Galbraith Lake area indicates that rocks in the Brooks Range and in the foothills of the north slope within this area may be within the oil window (Brosge et al., 1981). The area is unexplored. The petroleum potential of the Upper Paleozoic and Lower Mesozoic rocks in the Brooks Range is described separately from that of the unconformably overlying Cretaceous and Jurassic strata exposed in the foothills to the north because of their different settings.

Upper Paleozoic and Lower Mesozoic rock units in the Galbraith Lake area include, in ascending stratigraphic order, the Kayak Shale, Lisburne and Sadlerochit Groups, and the Shublik Formation. Lower Paleozoic-Proterozoic metamorphic 'economic basement' is not exposed at the surface but probably shallowly underlies the area. Upper Paleozoic and Lower Mesozoic strata are apparently detached from the basement by shallowly inclined faults in the Kayak Shale.

Potential source rocks in the Upper Paleozoic and Lower Mesozoic strata are the Kayak Shale and the Shublik Formation. These formations are likely supermature and therefore any petroleum deposits that are present will probably be gas. Potential reservoir rocks include sandstones of the Sadlerochit Group and fractured Lisburne Group limestone. No permeability or porosity data are available for these rocks in the Galbraith Lake area. However, the structure of the Upper Paleozoic and Lower Mesozoic strata in the Galbraith Lake area is extremely complex and the trapping structures are small and fragmented. Small gas fields are not economic on the north slope. The oil potential of these rocks is very low.

Cretaceous and Jurassic strata, Kongakut, Okpikruak, and Fortress Mountain Formations and Nanushuk Group underlie about 125 square miles (324 km²) of the north slope foothills in the Galbraith Lake area. Potential source rocks in these strata include the shale members of the Kongakut Formation and Nanushuk Group, especially the 'pebble shale.' These potential source rocks are probably mature to supermature (Brosge et al., 1981; Molenaar et al., 1986). Underlying supermature to overmature Upper Paleozoic and Lower Mesozoic strata and the Kingak Shale (if present in the subsurface) may have also been source rocks for the potential Cretaceous and Jurassic reservoirs.

Gas is the common hydrocarbon in exploration wells closest to the Galbraith Lake area, but oil is also possible. Potential reservoir horizons are thick sandstone tongues of the Fortress Mountain Formation and the Nanushuk Group. The Kemik sandstone does not appear to be present and the Okpikruak Formation is presumed to be too tight (Molenaar et al., 1986). Structure is complex and the field size is expected to be small. Few, if any, economic fields thus are likely to be present in the small foothills portion of the Galbraith Lake area underlain by Cretaceous and Jurassic strata.

Coastal Plain - The "1002" coastal plain area is rated by geologists as the most outstanding petroleum exploration target on land in the United States (Clough, Patton and Christiansen, 1987). Data from nearby wells in the Prudhoe Bay area and in the Canadian Beaufort Sea and Mackenzie Delta, combined with promising seismic data gathered on the "1002" area, indicate extensions of producing trends and other geologic conditions exceptionally favorable for discovery of one or more supergiant fields (larger than 500 million barrels). There is a 19% chance that economically recoverable oil occurs on the "1002" area. The average of all estimates of conditional economically recoverable oil resources (the "mean") is 3.2 billion barrels. (For a detailed assessment of the oil and gas potential of the "1002" area, see Clough, Patton and Christiansen, 1987.)

To the east of the "1002" area, trending from the Aichilik River to the Canadian border there are large subsurface structures present. Surface geology mapping along the Leffingwell Ridge, which extends into this region, also indicates the presence of good source and reservoir rocks (Hansen, pers. com.)

Water Resources

The refuge encompasses many stream drainages on the north and south slopes of the Brooks Range, with a wide variety of aquatic habitat types. Flowing waters are represented by a continuum from small tundra streams with intermittent flow to large streams such as the Canning River, with an estimated 50-year flood discharge of 13,500 cubic feet per second (Childers et al., 1973). Fourteen named rivers cross the coastal plain as they flow northward. The longest are the Canning and Kongakut rivers. The Coleen, Sheenjek, Chandalar, and Porcupine rivers drain the southern portion of the refuge. In the eastern Brooks Range, all streams flowing north from the mountains cross the coastal plain and enter the Beaufort Sea, while those flowing southward cross the Porcupine Plateau enroute to the Yukon River. Most of the water comes from spring or ground water, precipitation and surface permafrost thaw. Several north slope streams receive water from glacial melt. River water levels fluctuate greatly throughout the year. Peak flows are associated with ice and snow rapidly melting under continuous sunlight in early summer, and rainfall during late summer. River levels recede by October and most cease to exhibit any measurable flow during the winter; exceptions are those fed by springs.

Most of the lakes and ponds on the refuge are associated with the deltas of some of the major north slope rivers and floodplains of some of the major south slope rivers (e.g., the Chandalar, Sheenjek, and Porcupine rivers). Most of the refuge's lakes are shallow thaw lakes that provide unsuitable fish habitat through the winter. Some deeper foothill and mountain lakes, such as Peters-Schrader, Porcupine, and Old John lakes, provide overwintering habitat for resident fish populations. Some of the coastal lakes may be important summer feeding areas for freshwater, anadromous and marine fish, depending on suitable access.

Springs, lagoons, river deltas and other brackish coastal waters are important habitats for the refuge's anadromous and freshwater fish populations. During late winter, springs supply most of the free-flowing water in arctic Alaska. Several springs in the Arctic Refuge provide important habitat for spawning, rearing and overwintering. The importance of springs has been documented for arctic char on the north slope and chum salmon on the south side of the refuge. The lagoons, river deltas, and other brackish waters along the Beaufort Sea coast provide valuable feeding habitat for anadromous and marine fishes. Marine nearshore waters have been shown to be important spawning and overwintering areas for many marine species (Craig and Haldorson, 1980).

Ice-free overwintering areas are thought to be the greatest limiting factor for arctic anadromous and freshwater fish populations. With the onset of winter many refuge lakes and streams freeze to the bottom. Fish can only survive through the winter in deeper pools, spring areas and brackish river deltas.

Available overwintering habitat becomes more limited as spring approaches. Maximum ice accumulation usually occurs between late March and early May. Reductions in pool size decrease the dissolved oxygen concentration. Fish concentrate in the remaining ice-free pools, which in turn can increase the amount of organic matter in each area and further depress oxygen levels. Decreases in the availability of ice-free waters and dissolved oxygen concentrations can result in fish kills, although no such natural fish mortalities have been documented in the refuge.

Water Quality

Water quality information for much of the Arctic Refuge is sparse, but water quality is thought to be generally good throughout the refuge. To date, the refuge has experienced relatively low human impact. Water quality is usually dependent on seasonal changes. Rivers are temporarily high and turbid during spring melt and summer rain storms. Severe winter conditions also can affect water quality. Ice formation in shallow areas tends to concentrate minerals and organic matter in the remaining unfrozen water. Dissolved oxygen also decreases in the available water as the winter progresses.

BIOLOGICAL ENVIRONMENT

The Arctic Refuge is included within two major biomes: the northern coniferous or boreal forest, which lies on the south slope of the Brooks Range; and the arctic tundra, which lies on the north slope (USDI, 1974). The crest of the Brooks Range, a transition or ecotone between these biomes, forms the third major biological zone found in the refuge. Biological information on the north slope of the refuge is more extensive than that for the south slope, largely as a result of the baseline studies mandated on the coastal plain by Section 1002(c) of the Alaska Lands Act (USDI-FWS, 1982; Garner and Reynolds, 1983-1986, and In Press).

The north slope is predominantly a tundra coastal plain that is traversed by numerous north-flowing rivers. Habitats on the north slope can be classified into four broad categories: the coastal lagoons, nearshore coastal (wet) tundra and lakes, river floodplains with willow shrub thickets, and upland (moist) tundra areas.

In the mountainous zone, barren rock and sparse, dry alpine tundra predominate. Mountain valleys may contain moist tundra along with areas of shrub willow thickets in some of the river courses and protected valleys.

South of the mountain divide, the biological environment is more complex and varied. Moist tundra areas are scattered throughout the south slope. Shrub thickets occur in higher floodplains, near treeline, and on gravel moraines. Treeless bogs and muskeg areas are found mostly along major river courses in their lower floodplains. Lakes are frequently found in association with these areas. The northern limit of the boreal forest is found on the south slope of the Brooks Range. Black and white spruce are the primary species, with white spruce being dominant. Timberline varies between 4,000 and 5,000 feet (1220 and 1525 m) elevation.

Vegetation and Cover Types

The vegetation of Alaska has been mapped by the Joint Federal-State Land Use Planning Commission for Alaska (1973) and by Kuchler (1966). Eight major classes of vegetation recognized by the Commission are found in the Arctic Refuge: 1) wet tundra; 2) moist tundra; 3) high brush; 4) alpine tundra; 5) upland spruce-hardwood forest; 6) low brush-muskeg-bog; 7) bottomland spruce-poplar forest; and 8) lowland spruce-hardwood forest. In Selkregg (1975) the same basic categories and delineations were used.

Presently, there are no exhaustive published works that describe the flora of the entire Arctic Refuge, and most of the current knowledge is derived from regional and local studies.^{a/} A brief discussion of vegetation follows for each of the three major biological zones in the refuge.

^{a/} A list of plant species identified to date is on file at the refuge headquarters in Fairbanks.

Coastal Plain - Studies that have dealt with north slope vegetation include Sigafos (1952), Britton (1957), Spetzman (1959), Wiggins and Thomas (1962), Johnson et al. (1966), Hettinger and Janz (1974), and Walker et al. (1982). The latter study mapped and described five major terrain types with distinctive vegetation assemblages on the "1002" coastal plain area: thaw lake plains; hilly coastal plains; river flood plains; foothills; and mountains. The information presented below is based largely on the work of Walker et al. (1982).

The three most abundant terrain types in the "1002" area are the foothills, river floodplains, and hilly coastal plains. The foothills terrain type is the most common in the "1002" coastal plain area, covering about 45% of the area. It extends as broken segments from the Canning River to the border with Canada. The type is characterized by rounded hills and variable moisture environments varying in elevation from 300 to 1,250 feet (92 to 381 m). The moist sedge tussock and dwarf shrub tundra are the principal plant cover types. They are characterized by a mixture of dwarf birch (Betula nana) and diamond-leaved willow (Salix planifolia) on the moist water tracks. Sphagnum and other mosses, ericaceous shrubs (e.g., alpine blueberry [Vaccinium uliginosum], Labrador tea [Ledum decumbens]), and several sedges are common in the drier areas.

The river floodplain is a terrain type restricted largely to existing and recent floodplains of the major river systems. This category occupies over 25% of the "1002" coastal plain area, forming the second largest terrain type north of the Brooks Range. The plant communities of this terrain type are complex and may vary in composition due to such factors as the newness of colonization and the annual cycle of disturbance during spring break-up. Newly colonized communities frequently include the river beauty (Epilobium latifolium) and wormwood (Artemisia arctica), while more established communities often include willow species (Salix spp.), arctic avens (Dryas integrifolia), blackish oxytrope (Oxytropis nigrescens), paintbrushes (Castilleja candata), and other less common grasses, forbs and shrubs.

The hilly coastal plains occupies about 22% of the "1002" coastal plain area, mainly north of the foothills and between the Sadlerochit and Sikrelurak Rivers. Wet sedge tundra, moist sedge tundra and complexes of the two are the principal plant communities. The plant species present are similar to those of the flat thaw lake plains, but species composition does vary. Dominant plant types for this area include sedges, mosses, lichens, and a few small shrubs.

Brooks Range - Studies on the vegetation of this zone have been done by Spetzman (1959), Hettinger and Janz (1974), and Batten (1977). Most of the Brooks Range vegetation is found between the foothills and 5,578 feet (1700 m) elevation. Some species are found up to elevations of 6,700 feet (2050 m) but few beyond this.

Hettinger and Janz (1974) have divided the mountain areas into six major terrain types: bedrock; montane and submontane colluvium; talus slopes; alluvial fan deposits; alpine glacial moraine deposits; and active and fossil floodplains. Within these six major terrain types eleven vegetation types were identified: riparian willow shrub; arctic bearberry - herb with open

balsam poplar; white spruce forest; low birch shrub with scattered white spruce; low and dwarf willow shrub tundra; alpine sedge meadow; alpine heath - Dryas meadows; alpine Dryas - sedge meadows; alpine Dryas meadows and barrens; and alpine dwarf shrub - lichen fellfield.

Interior and Porcupine Plateau - Spetzman (1959), Johnson and Vogel (1966), and Hettinger and Janz (1974) studied the vegetation of these areas. Hettinger and Janz (1974) recognized 11 major vegetation types for the Porcupine Plateau Physiographic Province. In the same study, the authors described six major vegetation types for the Southern Foothills Physiographic Province.

Johnson and Vogel (1966) described the vegetation types of the Yukon Flats region, which includes a portion of the southern part of the Arctic Refuge. Three of their study sites were within the refuge, and all were of the white spruce type. Species present within these communities included: white spruce (Picea glauca), prickly rose (Rosa acicularis), white birch (Betula glandulosa), Labrador tea (Ledum decumbens), bog blueberry (Vaccinium uliginosum), mountain cranberry (Vaccinium vitis-idaea), shrubby cinquefoil (Potentilla fruticosa), soapberry (Shepherdia canadensis), and willows (Salix spp.).

Cover Type Classification

A cooperative effort between the Service and the U.S. Geological Survey using Landsat imagery has resulted in a land cover type classification system of 23 classes for the biotic and abiotic land cover features of the refuge. These classes are described in Appendix D. Figures 7-16 show the distribution of 19 of these land cover types on the refuge.

Wetland Resources

The Service defines wetlands as lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following three attributes; 1) at least periodically, the land supports predominantly hydrophytes^{a/}; 2) the substrate is predominantly undrained hydric soils^{b/}; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

^{a/}The Service has prepared a list of hydrophytes and other plants occurring in wetlands of Alaska.

^{b/}The U.S. Soil Conservation Service has prepared a list of hydric soils for use in this classification system.

Figure 7. Cover types - barren scree and barren floodplain.

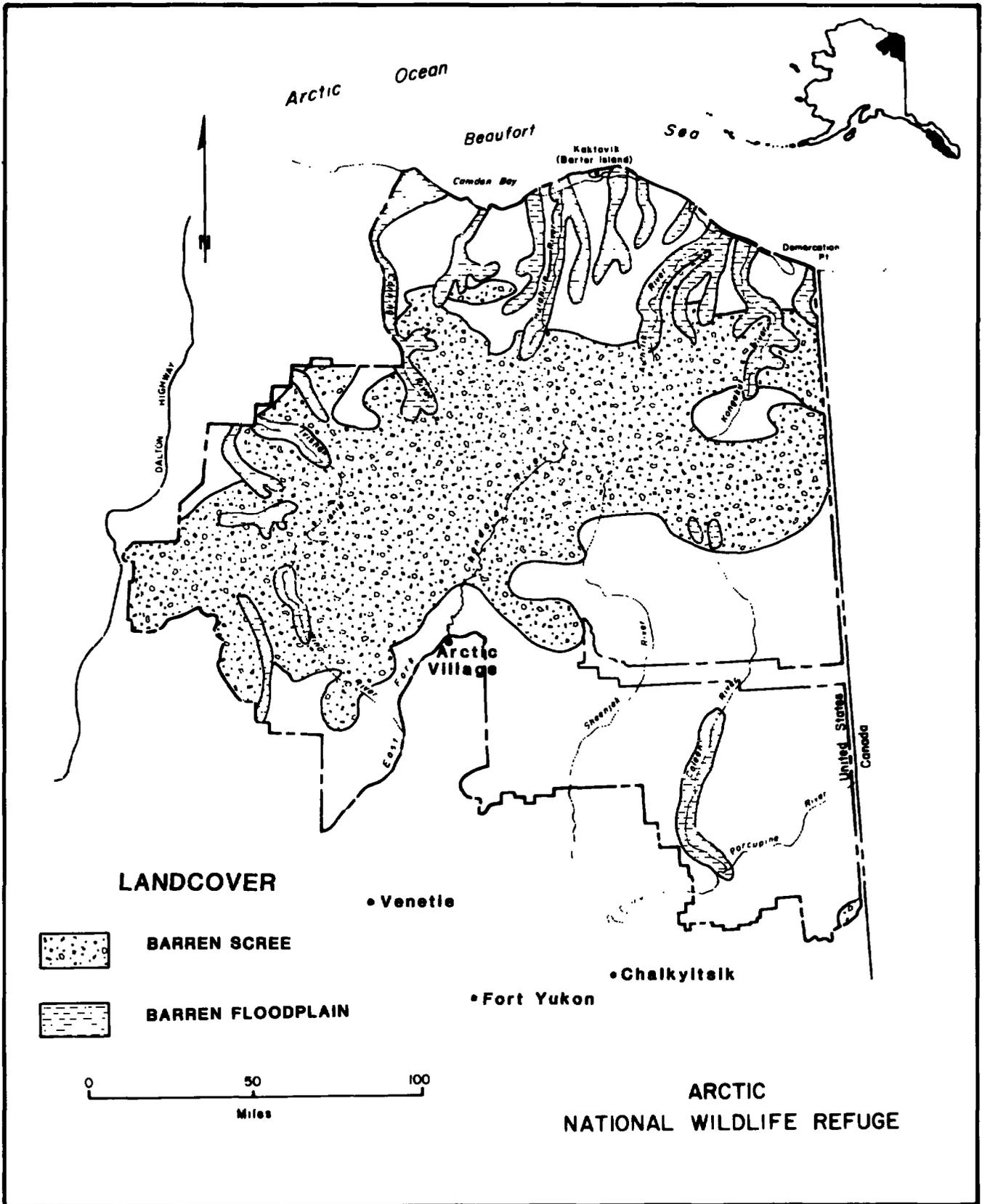


Figure 8. Cover types - scarcely vegetated scree and scarcely vegetated floodplain.

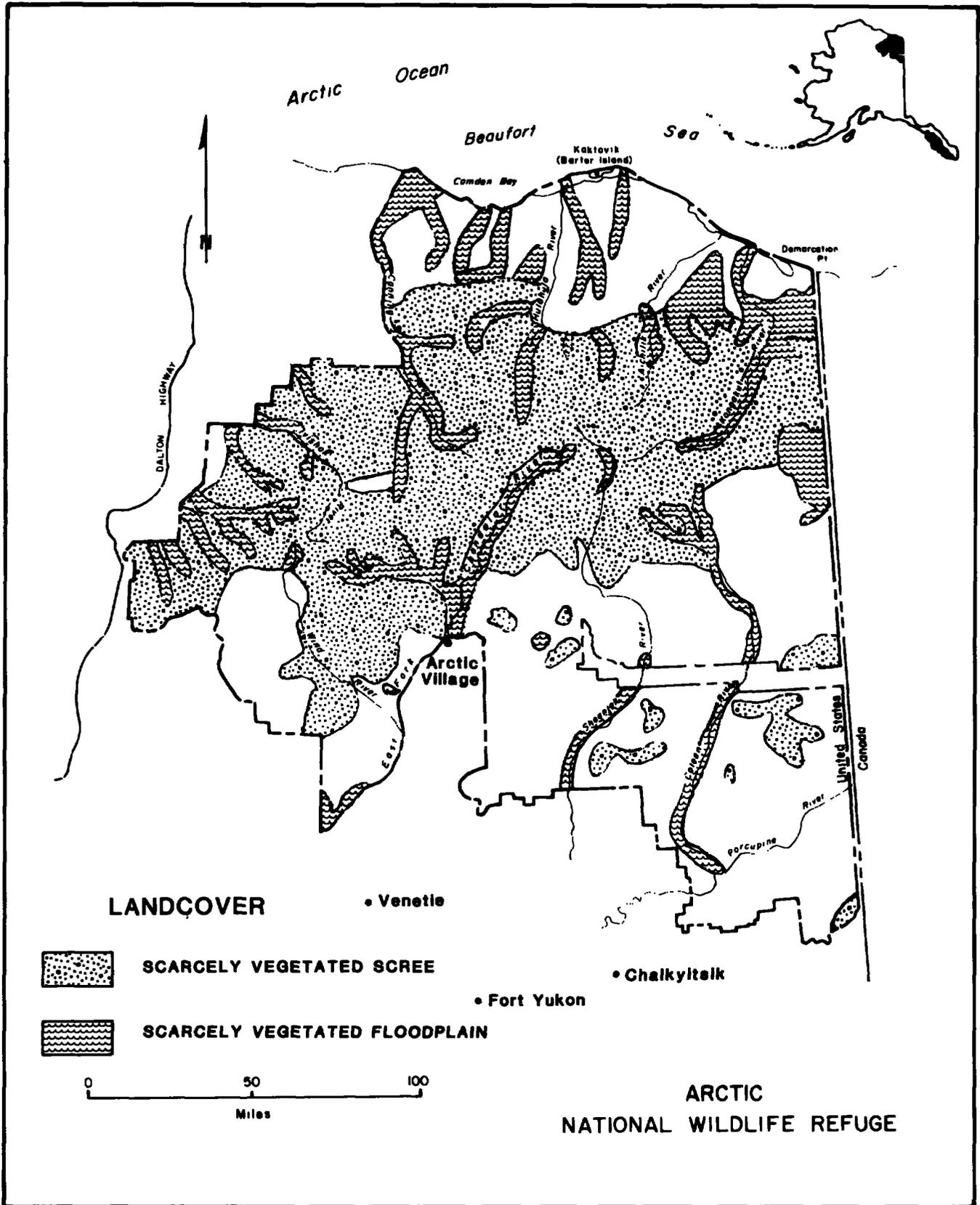


Figure 9. Cover types - wet graminoid and very wet graminoid.

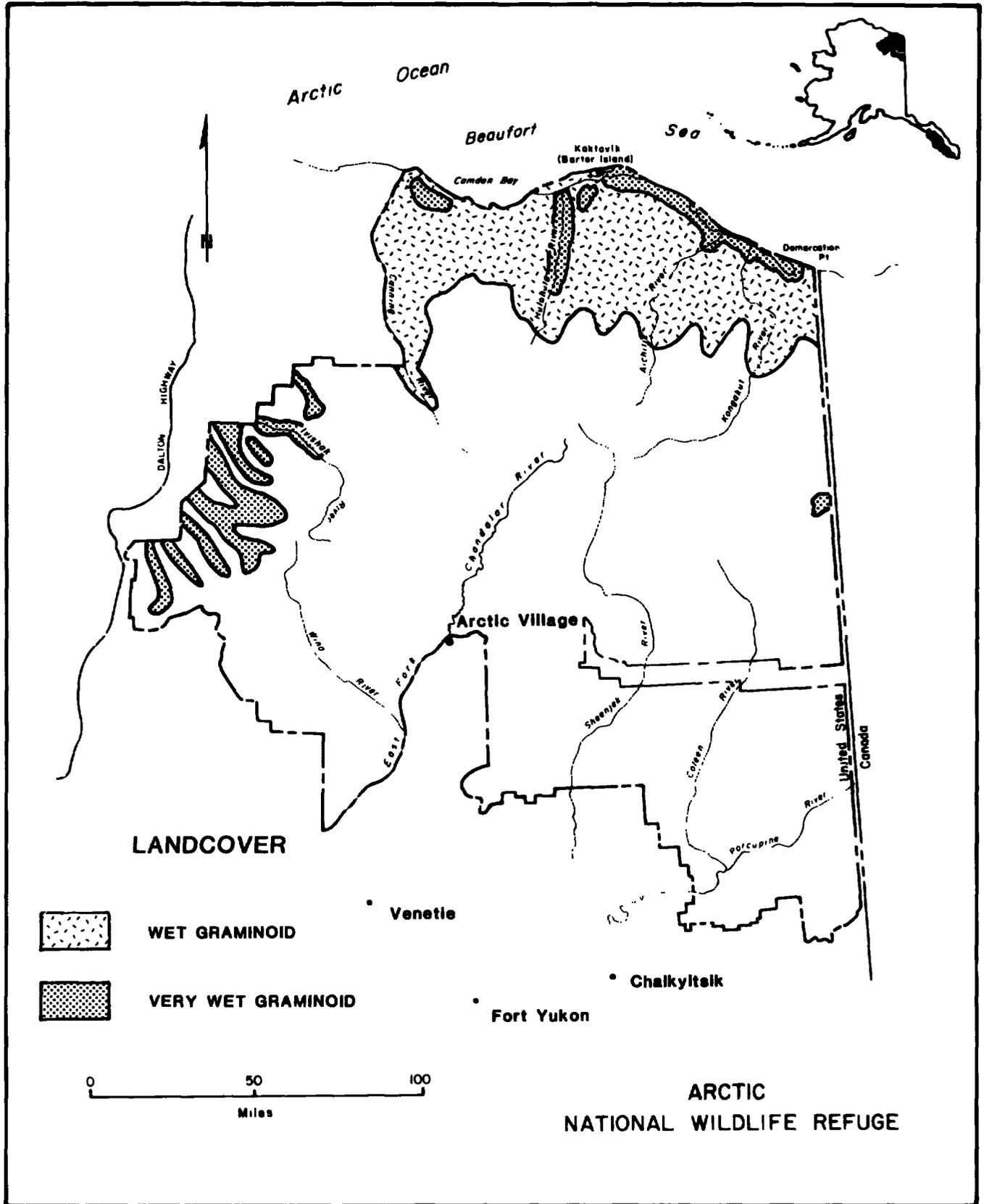


Figure 10. Cover types - moist graminoid tussock and moist/wet tundra complex.

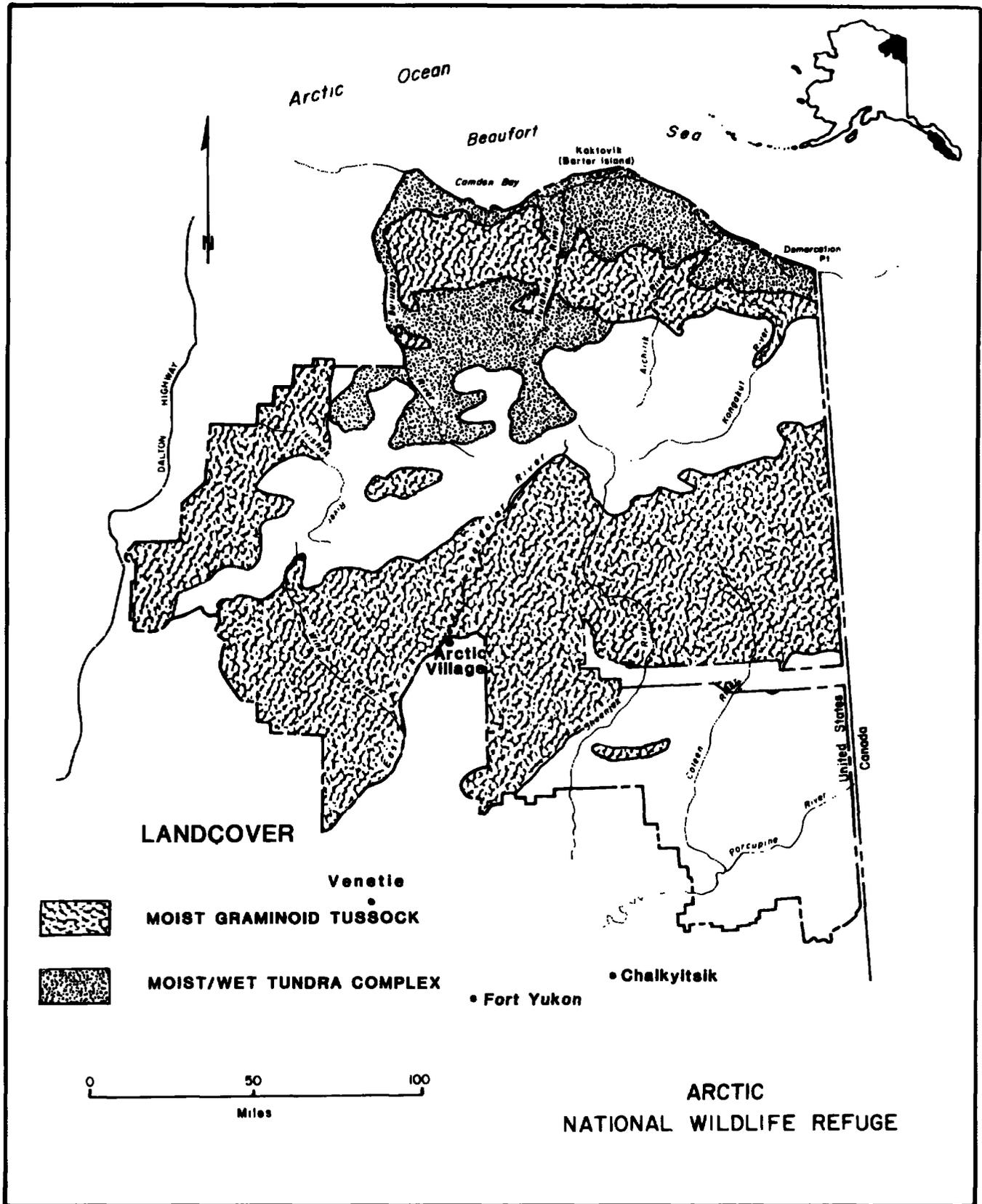


Figure 11. Cover types - mesic erect dwarf scrub and moist prostrate dwarf scrub.

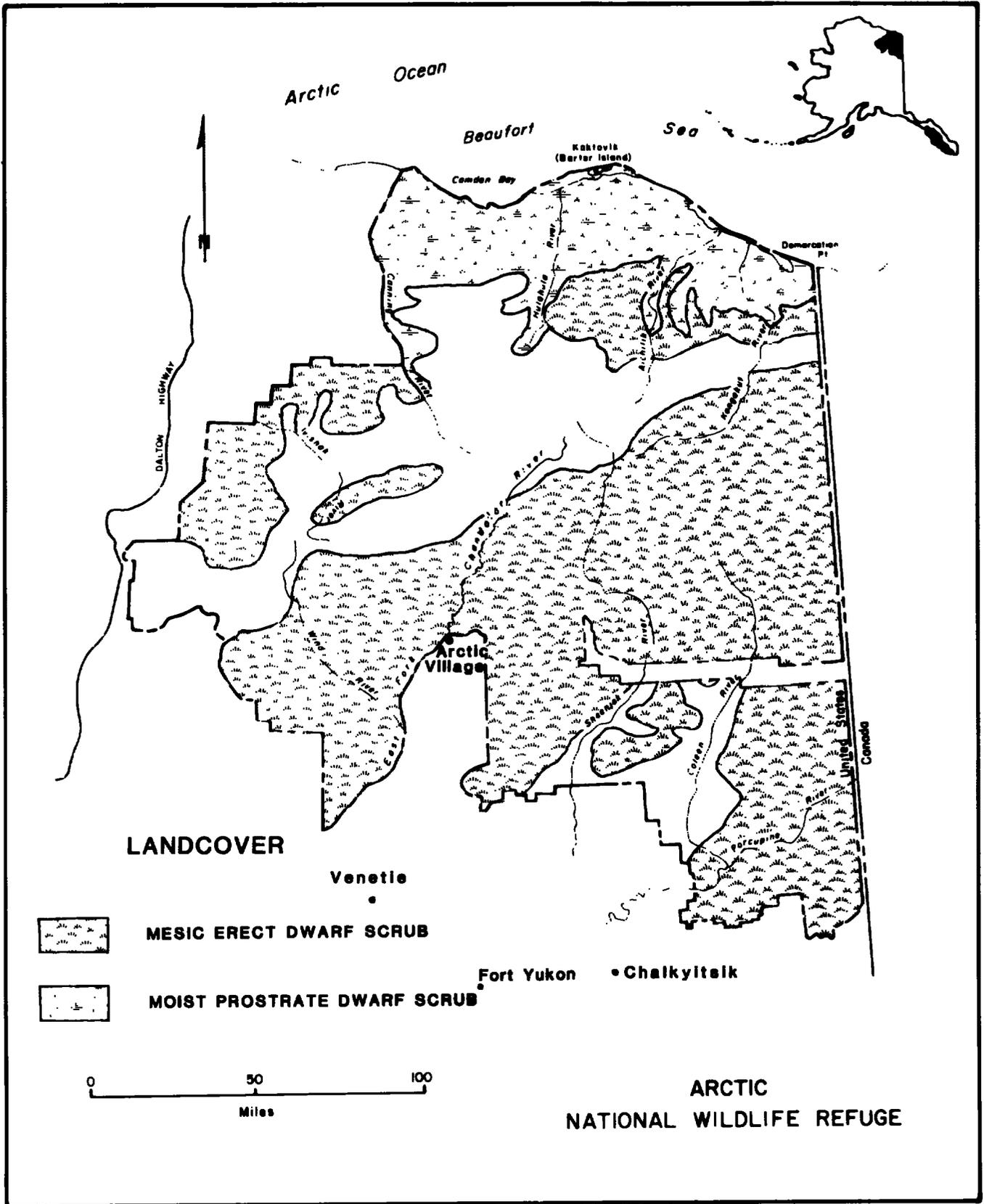


Figure 12. Cover types - alluvial deciduous scrub and dry prostrate dwarf scrub.

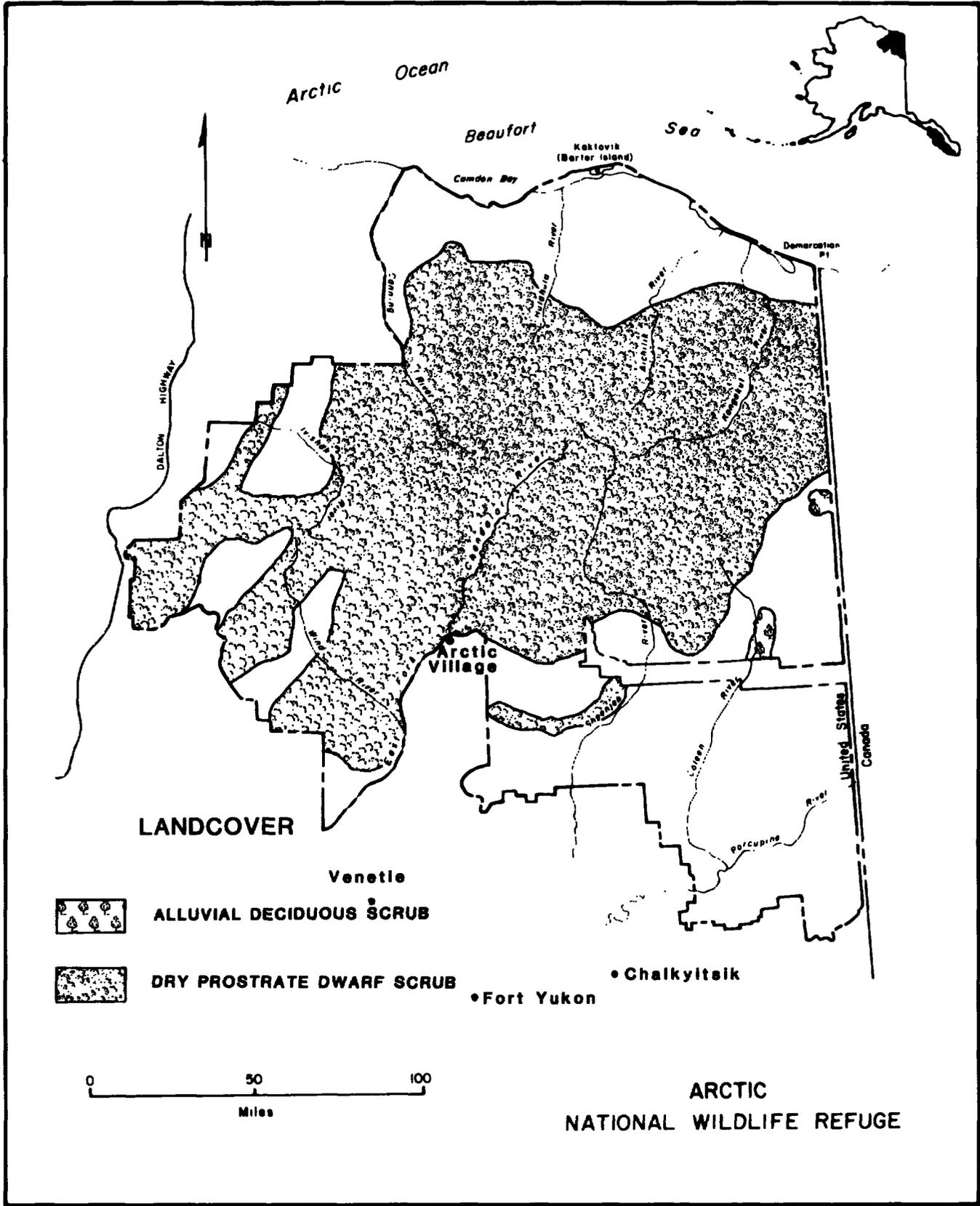


Figure 13. Cover types - open needleleaf and closed needleleaf.

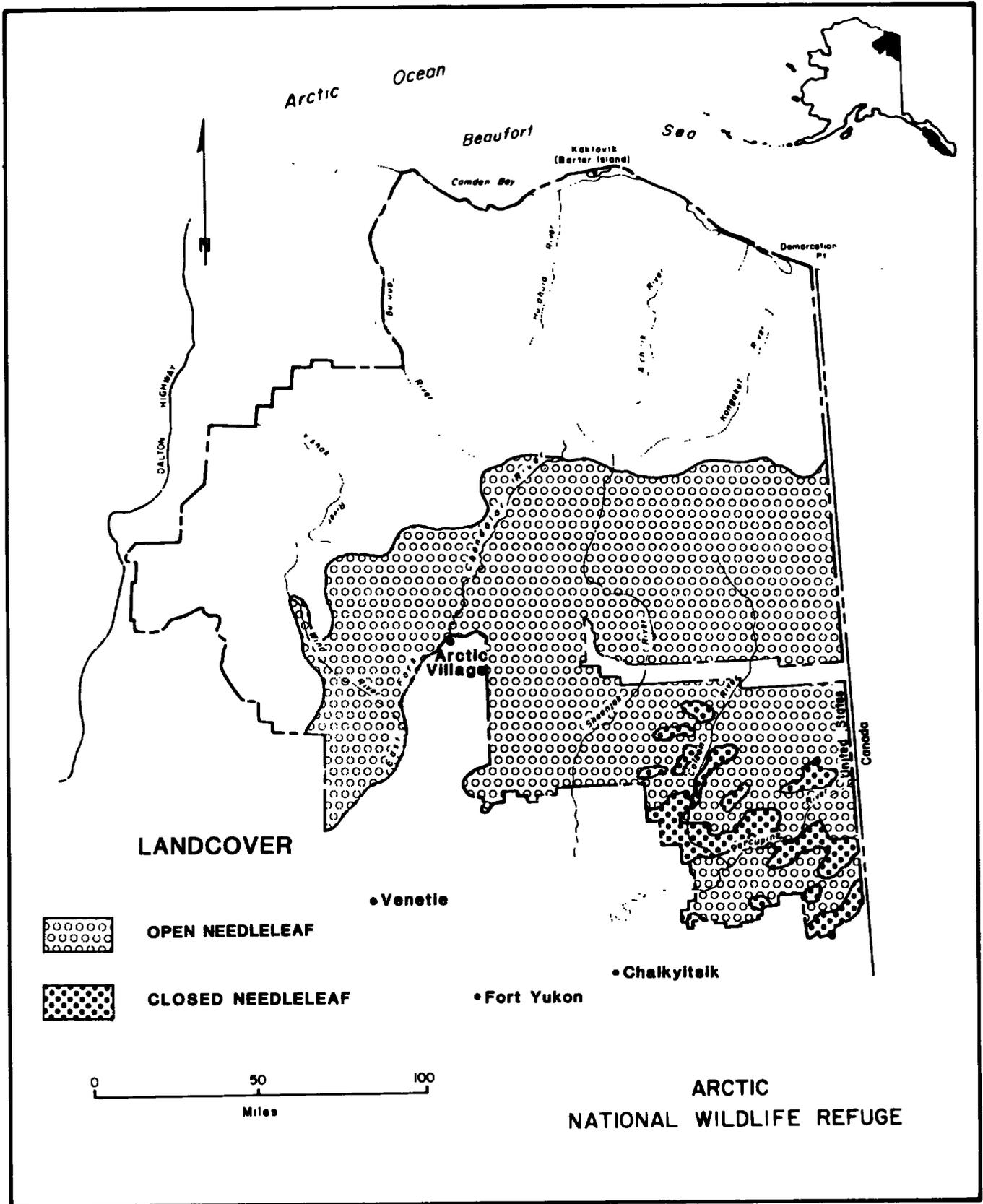


Figure 14. Cover type - needleleaf woodland.

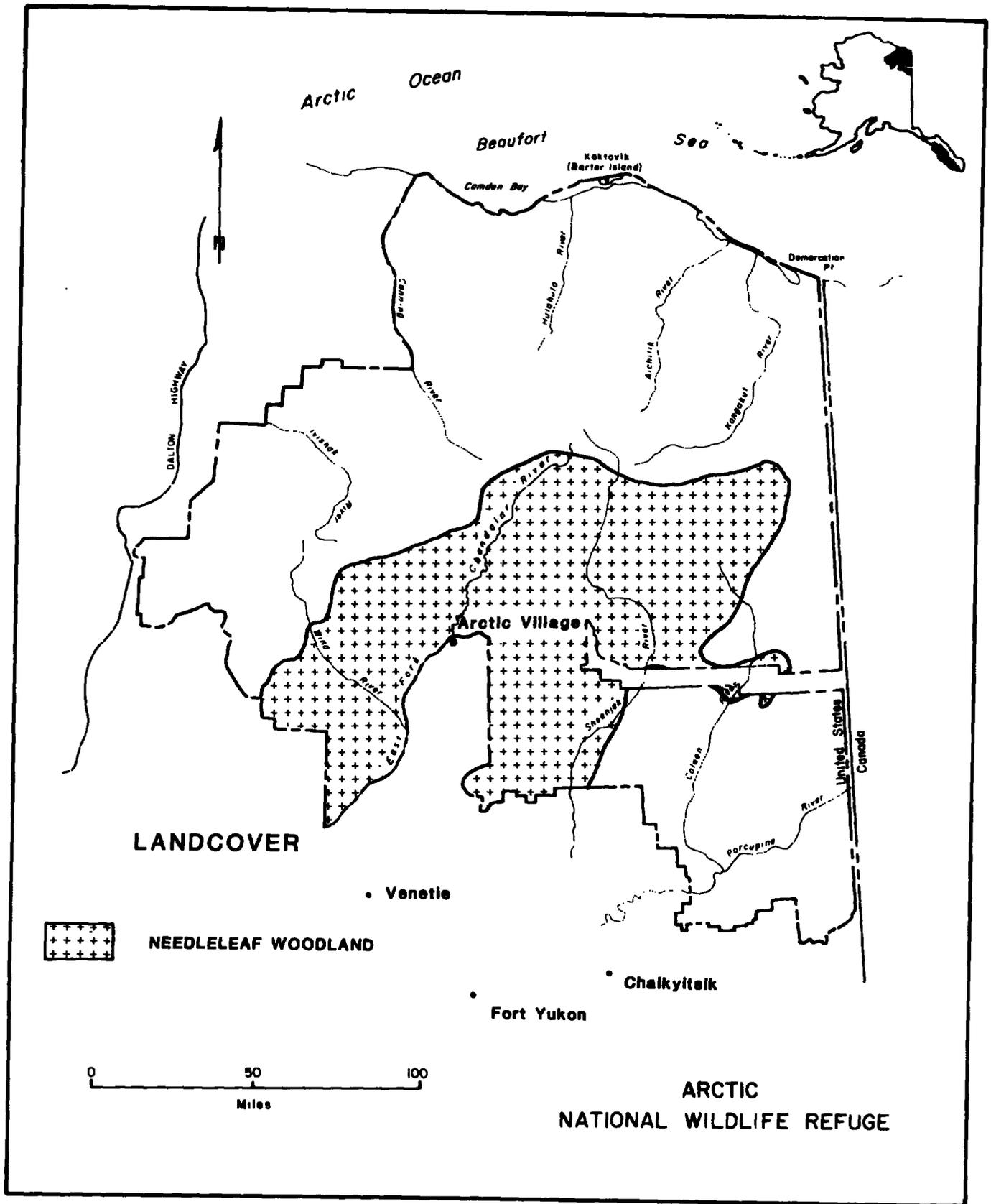


Figure 15. Cover types - mixed forest and deciduous forest/tall shrub.

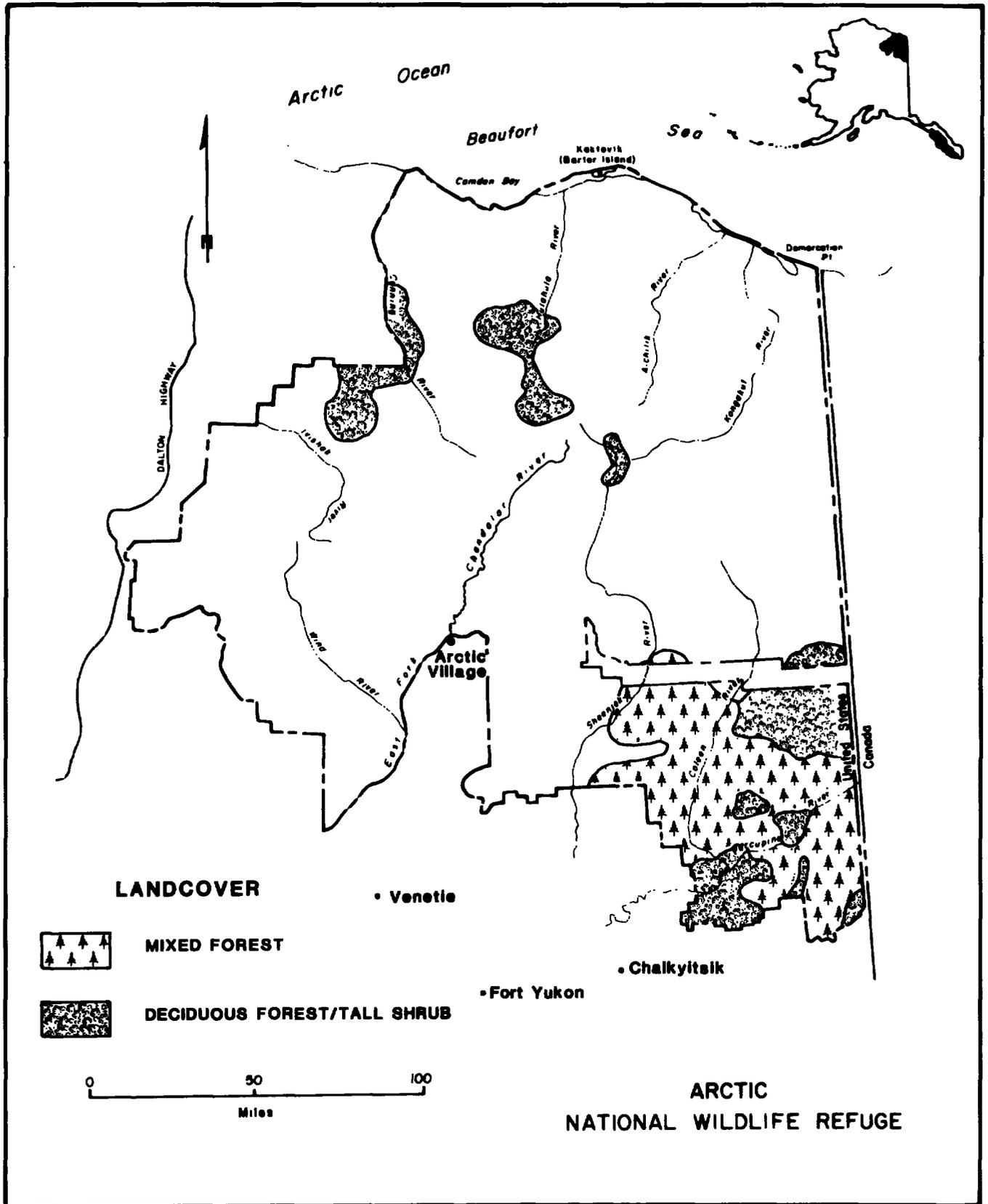
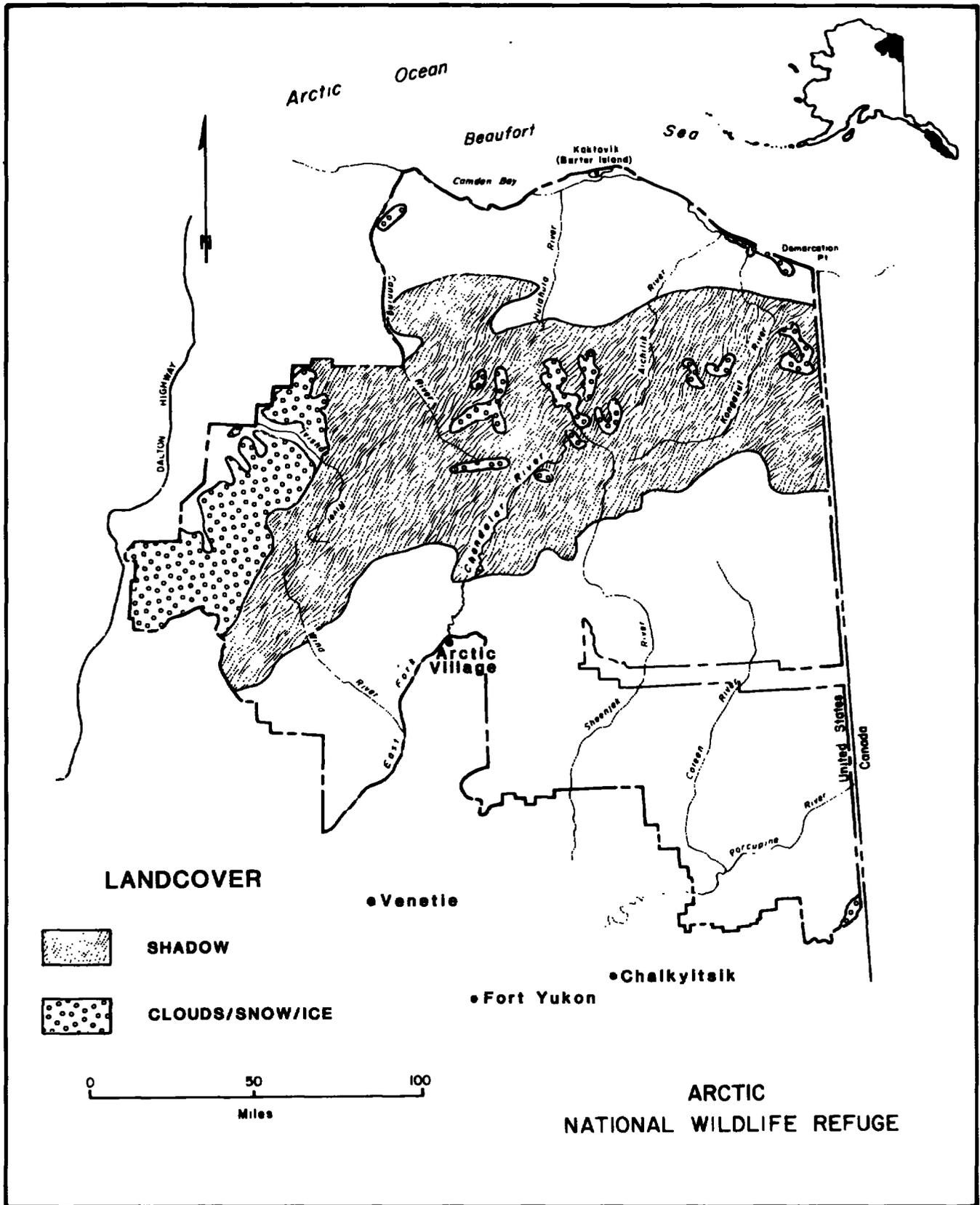


Figure 16. Cover types - shadow and clouds/snow/ice.



The extent of wetlands in the Arctic Refuge was estimated from the Landsat satellite land cover information. Table 5 shows the correlation of the cover types with the Service's wetland classification system (Cowardin et al., 1979). Because wetlands were not specifically addressed during the refuge land cover mapping effort, some land cover types include both wetland and upland habitats. In these cases, the percentage of wetlands included in each land cover type was estimated. The estimates are based on the detailed descriptions of the cover classes, and on manual interpretation of enhanced Landsat scenes. Some of the refuge cover classes correlate directly with the wetland classification system. For example, the very wet graminoid cover class is considered wetland in all situations. This type correlates with the palustrine, emergent, semipermanently flooded wetland category.

Much of the wetland acreage in the Arctic Refuge is maintained by the presence of permafrost. Areas having a dense vegetative cover are often characterized by permafrost occurring at a shallow depth due to the insulating effect of the organic mat. The soil in these areas remains saturated near the surface throughout most of the growing season. The vegetation in these areas is composed mainly of species typically adapted for life in saturated soil conditions.

Fish and Wildlife

There are at least 252 resident and migratory vertebrate species that use the Arctic Refuge's habitats: 36 fish, 169 bird, 36 terrestrial mammal, and 8 marine mammal species (Appendices E-G).^{a/}

Fish

At least 36 fish species have been documented as inhabiting the waters within the Arctic Refuge. These species and their general areas of occurrence are listed in Appendix E. Arctic grayling, lake trout, arctic char/Dolly Varden, chum, chinook, coho and pink salmon, whitefish, northern pike, burbot, and arctic cod are all harvested by subsistence and sport fishermen in refuge waters, although the number of fish harvested is unknown. Figure 17 shows the general locations of important freshwater fish habitats in the refuge, including spawning and overwintering areas. The following paragraphs discuss some of the more ecologically and economically important fishes of the area.

Northern Pike - The northern pike is widely distributed throughout most of Alaska, but is rare in arctic Alaska. Northern pike can be found in the rivers and lakes on the south slope of the refuge, but only incidental catches have been reported on the north slope of the refuge (Scott and Crossman, 1973). Northern pike spawn in weedy areas in lakes, sloughs, and flooded areas in river systems as soon as the ice breaks up. Spawning is usually associated with lengthy migration runs. Eggs hatch rapidly and the young remain in shallow areas for several weeks. Northern pike mature in three to five years in Alaska (Cheny, 1971). An unknown number of northern pike are harvested in the refuge by Kaktovik residents and other refuge users.

^{a/}For more detailed information on fish and wildlife in the "1002" coastal plain area, see USDI-FWS, 1982, and Garner and Reynolds, 1982-1986.

Table 5. Correlation of cover types and equivalent wetland types within the Arctic Refuge.

Refuge Plan Cover Class	Acres	(% Wetland	Wetlands	
			Equivalent Wetland Types	Acres
Closed needleleaf forest	314,684	15%	Palustrine, forested, needle-leaved evergreen, saturated	47,203
Open needleleaf forest	1,375,087	70%	Palustrine, forested, needle-leaved evergreen, saturated	962,561
Needleleaf woodland	843,577	80%	Palustrine, scrub-shrub, broad-leaved deciduous, saturated	674,862
Mixed forest	215,675	10%	Palustrine, forested, broad-leaved deciduous/needle-leaved evergreen temporarily flooded	21,568
Deciduous forest/tall shrub	223,522	15%	Palustrine, forested, broad-leaved deciduous, temporarily flooded	33,528
Alluvial deciduous shrub	14,922	75%	Palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded	11,192
Dry prostrate dwarf scrub	1,872,156	0%	Non-wetland	---
Moist prostrate dwarf scrub	754,944	60%	Palustrine, scrub-shrub, broad-leaved deciduous, saturated	452,966
Mesic erect dwarf scrub	4,813,772	75%	Palustrine, scrub-shrub, broad-leaved deciduous, saturated	3,610,329
Very wet graminoid	14,400	100%	Palustrine, emergent, permanently flooded	14,400
Wet graminoid	365,960	100%	Palustrine, emergent, semi-permanently flooded or seasonally flooded	365,960
Moist/wet tundra complex	508,491	100%	Palustrine, emergent, semi-permanently flooded or seasonally flooded	508,491
Moist graminoid tussock	1,490,520	80%	Palustrine, emergent/scrub-shrub, broad-leaved deciduous, saturated	1,192,416
Barren floodplain	144,586	100%	Riverine, unconsolidated shore, temporarily flooded or seasonally flooded	144,586
Barren scree	1,337,679	0%	Non-wetland	---
Scarcely vegetated floodplain	131,149	50%	Palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded	65,574
Scarcely vegetated scree	1,881,111	0%	Non-wetland	---
Clear water	96,683	100%	Palustrine, open water, permanently flooded; or lacustrine limnetic, open water, permanently flooded; or riverine, open water, permanently flooded	96,683
Shallow water	12,677	100%	Riverine, unconsolidated shore/open water	12,677
Offshore water	110,089	100%	Marine, subtidal, open water; or estuarine, subtidal, open water	110,089
Clouds, snow, ice	312,679	Unknown	Not applicable	---
Shadow	1,713,933	Unknown	Not applicable	---
Roads	0	0%	Non-wetland	---
TOTAL	18,547,296			8,325,085

^{a/}Cover class acreages were not calculated for 971,000 acres of state selections that were added to the refuge in 1983. Wetlands were classified to the subclass level using the U.S. Fish and Wildlife Service's Classification of wetlands and deepwater habitats in the United States (Cowardin et al, 1979).

Lake Trout - Lake trout are widely distributed across Alaska's north slope, as far west as the Colville River, where suitable habitat exists (Morrow, 1980). On the north slope of the refuge they are reported to occur in the coastal plain lakes near the Canning River drainage (Craig, 1977), Lakes Peters-Schrader, and Okpilak Lake. On the south slope lake trout occur in Old John and Blackfish lakes near Arctic Village; some of the oldest and largest fish found by Craig and Wells (1975) were in these lakes. Lake trout are probably present in other lakes on both the south and north slopes.

Spawning generally occurs in the fall over large boulder or rubble bottom in inland lakes at depths less than 43 feet (13 m) (Scott and Crossman, 1973). The timing of incubation and hatching vary depending on the habitat conditions but usually require 4 to 5 months. Little is known about lake trout overwintering, but they appear to remain in the lakes. Numbers of lake trout harvested within the refuge are unknown.

Arctic Char/Dolly Varden - This species is one of great diversity in morphology and life history pattern. Consequently, taxonomy and systematics are confused. For the purposes of this discussion the arctic char and Dolly Varden are considered a single species, Salvelinus alpinus. Arctic char are widespread throughout the northern portions of the refuge. Four life history patterns have been reported for arctic char in the area: anadromous, stream resident, spring resident, and lake resident (Craig, 1977). Most larger rivers on the refuge that drain into the Beaufort Sea support populations of anadromous char. Anadromous populations are found in the Hulahula, Canning, Aichilik and Kongakut rivers. Anadromous arctic char usually migrate several times between fresh and salt water during their life cycle. Spawning takes place in streams from late summer through fall in the vicinity of springwater sources, areas in which there is continual flow throughout the winter period (McCart, 1974). Relatively constant water temperatures around springs throughout the winter shelter the fertilized eggs. The young emerge from the gravel in the latter part of May. They remain in streams for 2 to 3 years before making their seaward migration.

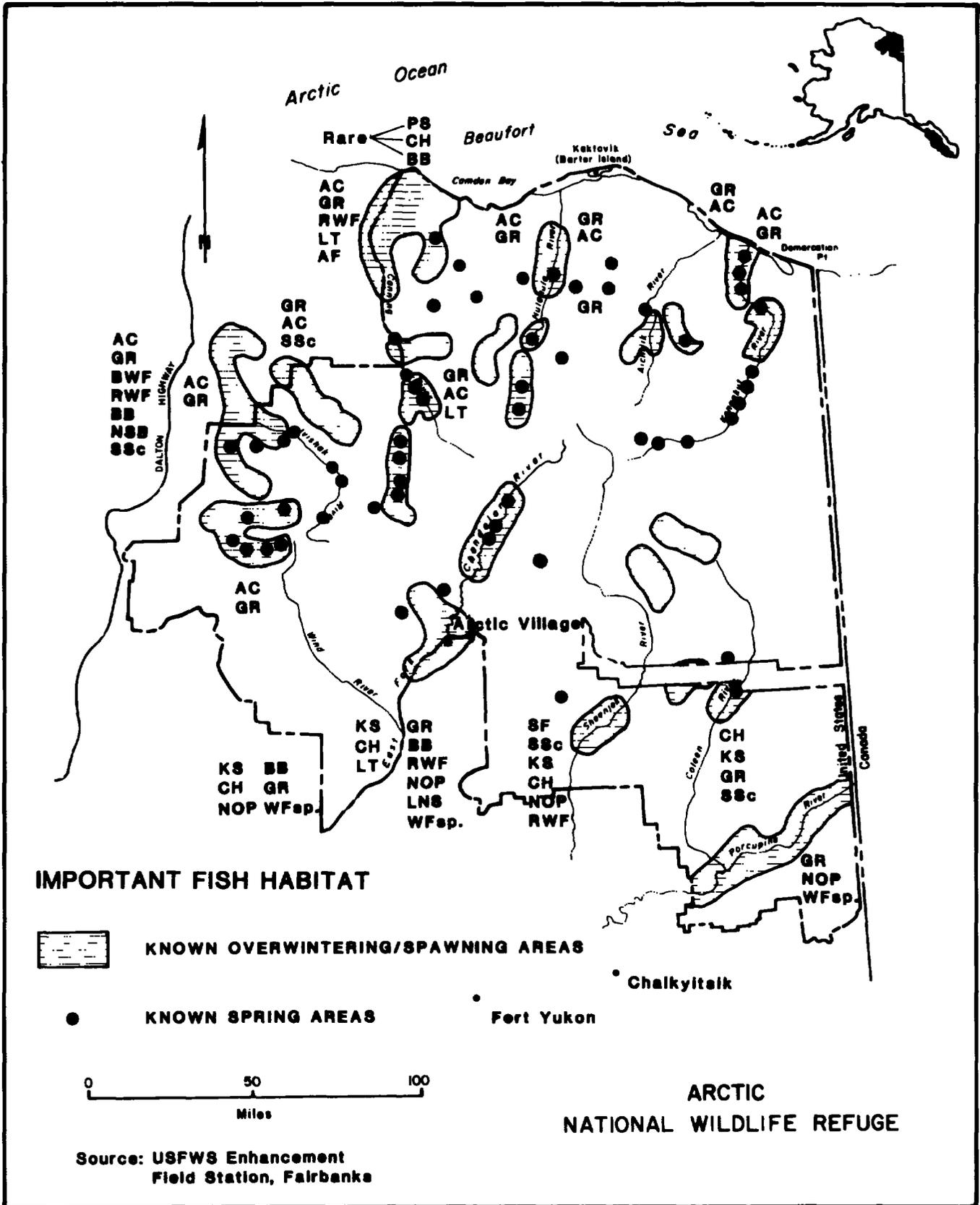
Anadromous arctic char that overwinter in spring-fed streams or lakes begin to move toward the sea during breakup. They feed in coastal waters until August when they begin their migration to spawning and overwintering areas.

Populations of resident char have been found in Lakes Peters-Schrader, Jago Lake, the Sadlerochit River and Shublik Spring on the Canning River. These populations remain in their respective stream, lake, or spring for all stages of their life history.

Arctic char probably occur in most of the upper drainages south of the Brooks Range. These resident populations are found in both stream and mountain lake habitats. Information is scarce on the specific distribution of this species within the southern part of the refuge.

The number of arctic char harvested in the refuge is unknown (see the discussion under "Subsistence" for estimates of char harvested by Kaktovik residents).

Figure 17. Important fish habitats.



LEGEND

SPECIES SHOWN

AC - Arctic Char

AF - Arctic Flounder

BB - Burbot

CH - Chum Salmon

GR - Grayling (ARCTIC)

HWF - Humpback Whitefish

KS - Chinook Salmon

LNS - Longnose Sucker

LT - Lake Trout

NOP - Northern pike

NSB - Ninespine Stickleback

PS - Pink Salmon

RWF - Round Whitefish

SF - Sheefish

SSc - Slimy Sculpin

WFsp. - Whitefish species

Whitefish - Almost all of the Alaskan species of whitefish are found in some portion of the refuge. (The only one not present is the pygmy whitefish). The least cisco, broad whitefish, and round whitefish are found on both the north and south sides of the refuge (Morrow, 1980; Alt, 1979). The Bering cisco, humpback whitefish and inconnu (or sheefish) is found only on the south side, while the arctic cisco is found only on the north side of the Brooks Range (Morrow, 1980; Alt, 1974). Although Morrow (1980) and McPhail and Lindsey (1970) recognize Alaska whitefish and lake whitefish as two additional species closely related to the humpback whitefish, Alt (1979) concluded that, for management purposes, in Alaska all whitefishes in this group should be considered humpback whitefish. Additional research is needed to adequately define the taxonomic and ecological status of the humpback whitefish complex in Alaska.

Arctic cisco - The arctic cisco is one of the most abundant and widely distributed fish along the Beaufort Sea coast. Arctic cisco have been reported in lagoons and river mouths along the refuge's coast (Roguski and Komarek, 1972; West and Wiswar, 1985; Wiswar and West, 1986; Wiswar et al., In Press) and from the lower Canning River (Craig, 1977). Craig and Mann (1974), however, found arctic cisco distribution restricted to marine or brackish water in the Beaufort Sea.

The Mackenzie River is thought to be the source of the arctic cisco stock found in the Beaufort Sea coastal waters. No spawning has been documented on the refuge or elsewhere in Alaska. Spawning in the Mackenzie River occurs between late September and October.

Although arctic ciscoes are known to overwinter in Alaska, overwintering areas are not well-documented. Craig and Haldorson (1980) found a non-spawning segment of the arctic cisco population overwintering in brackish water (18-32 parts per thousand) of the Colville River delta. They speculated that more arctic cisco overwintering was occurring in brackish river deltas and nearshore areas than previously thought. It is possible that the Canning River delta on the refuge is providing important overwintering habitat for arctic cisco.

The arctic cisco is harvested by local residents, although harvest data are sketchy. A commercial fishery for ciscoes also exists in the Colville River west of the refuge. Landings in this fishery have been stated as averaging 47,000 ciscoes and 18,000 (other) whitefish annually (Craig, 1984).

Least cisco - In the Beaufort Sea, least cisco have been reported to be abundant from Barrow to Prudhoe Bay and near the Mackenzie River but relatively scarce in-between (Craig and Haldorson, 1980). Least cisco have been documented in the Canning River delta (Craig, 1977) and offshore near the Canning River (Ward and Craig, 1974). They have also been found in refuge coastal lagoon waters (West and Wiswar, 1985; Wiswar and West, 1986; Wiswar et al., In Press). Bendock (1977) found least cisco to be more common inland of the barrier islands than seaward of these islands in the Beaufort Sea coastal waters. In the southern portion of the refuge, least cisco have been reported in the Yukon and Porcupine drainages (McPhail and Lindsey, 1970).

Spawning by least cisco on the refuge is possible, but considered unlikely by Smith and Glesne (1983). Ripe and spawned-out least cisco have been taken in the commercial fishery on the Colville River. Mature potential spawners also were found in the Colville River and in nearby coastal lakes (Craig and Haldorson, 1980). It is possible that spawning occurs in other lakes and stream drainages along the Beaufort Sea coast as well. Spawning is reported to take place in the fall over sand or gravel in shallows of rivers or along lake shores (Scott and Crossman, 1973).

Least cisco overwintering is unknown in the refuge, but it is possible that the Canning River delta could provide some overwintering habitat. Least ciscoes are thought to overwinter in both freshwater and brackish water of the Colville River delta in similar habitat utilized by arctic cisco (Craig and Haldorson, 1980).

Least ciscoes are taken by Kaktovik residents, but in unknown quantities.

Sheefish - The Porcupine River supports a small population of sheefish. They were reported by Alt (1974) to spawn at the mouth of the Coleen River and in the upper Porcupine River in Canada. Sheefish have been reported in the Sheenjek River below the mouth of the Koness River (Alt, pers. comm.). Spawning appears to be similar in these three areas. They spawn in fall in shallow water of either lakes or streams. They are broadcast spawners and do not provide parental care of the eggs. The eggs hatch in April or May. Young sheefish generally leave the shallow waters by early summer and move into deeper lakes, streams, or river delta areas (Scott and Crossman, 1973).

Salmon - Of the four species of salmon documented in waters within the refuge boundaries, chum salmon are present in the greatest number of Yukon River drainages, followed by chinook salmon. Coho salmon are also present in the upper Yukon and Porcupine rivers and have been observed in the Sheenjek River in the refuge (Barton, 1984). On the north slope, chum salmon have been collected in the Sagavanirktok and Canning rivers (AEIDC, 1975; Smith and Glesne, 1983). Pink salmon have been collected in the Canning and Sadlerochit rivers (Smith and Glesne, 1982), although these are thought to be unusual occurrences. No significant salmon spawning runs are known to occur on the north slope of the refuge.

Chum salmon - Most chum salmon captured on the Arctic Refuge are associated with the Yukon River. Only incidental catches have been reported in the Canning and Sagavanirktok rivers. Chum is the most abundant salmon species in the Yukon drainage, followed by chinook salmon (Barton, 1984). There are two distinct runs of chum that spawn in the Chandalar and Sheenjek rivers--summer and fall chum salmon. Runs of summer chum also occur in the Christian and the Coleen rivers. Fall chum salmon spawn further upstream, in spring-fed tributaries, while summer chum salmon spawn primarily in tributaries fed by run-off. Fall chum are less abundant than summer stocks (Buklis and Barton, 1984). Summer chum enter the refuge river systems from mid-July to August and average about one pound less than fall chum, which enter refuge rivers from August through September (McLean et al., 1977). The Chandalar and Sheenjek rivers provide important spawning habitat for fall chum within the Yukon River drainage (Buklis and Barton, 1984), although most spawning activity takes place south of the Arctic Refuge boundary.

Chum salmon eggs overwinter in the gravel redds and hatch in early spring. Soon after emergence from gravel in the spring, Yukon chum (both summer and fall) migrate as young-of-the-year fry to the Bering Sea. Adults attain sexual maturity and return to the Yukon River system to spawn in their third to sixth year, although 4 or 5 year old fish usually comprise 90% of the annual returns (Barton, pers. comm.). Aerial surveys conducted by the Service in 1985 documented chum spawning in portions of the Chandalar, Christian, Sheenjek and Coleen rivers (Rost, 1986). The Alaska Department of Fish and Game has monitored fall chum migration up the Sheenjek River since 1981. The 1985 escapement estimate was 152,768 for the lower river (Barton, 1986).

Chinook salmon - Chinook salmon have been found in four Arctic Refuge tributaries to the Yukon and Porcupine rivers: the Chandalar, Christian, Sheenjek and Coleen rivers (Rost, 1986). However, chinook salmon have been documented as spawning only in the Coleen River on the refuge. Adult chinook salmon enter refuge waters in mid-to-late-July on their way to spawning streams. Eggs overwinter in stream bottom gravel and hatch in early spring. Several days later fry emerge from the gravel and begin feeding in the streams, where they may stay for up to two years before they make their seaward migration. In the ocean environment they mature anywhere between their second and seventh years.

Arctic Grayling - Arctic grayling are widespread throughout the refuge (Craig and Wells, 1975; Morrow, 1980; Garner and Reynolds, 1986). Adults generally migrate from deep lakes, deep channels of rivers, river deltas, or spring-fed streams, where they overwinter, to spawning grounds when ice begins to break up. Grayling movements to spawning locations are associated with spring thawing and consequent higher flows in late May and early June. Spawning generally takes place in small tundra or foothill streams. Juvenile grayling move out of the smaller streams by September to deeper pools for overwintering (Craig and Poulin, 1974). On the northern portion of the refuge grayling sometimes migrate into coastal areas, concentrating around river mouths where salinities are low and food more abundant. Harvest levels of grayling are thought to be relatively low throughout the refuge.

Burbot - This species is widely distributed throughout Alaska, and is found in freshwater lakes and streams of the refuge. Within the north slope portion of the refuge it has been documented only in the Canning River (Craig, 1977; Smith and Glesne, 1983).

Spawning generally takes place in winter, probably during January and February. Burbot spawning habitat is described by Scott and Crossman (1973) as 1 to 4 feet (0.3-1.0 m) of water over sand in streams or in gravel shoals 5 to 10 feet (1.5-3.0 m) deep in lakes. Eggs hatch in approximately 30 days at water temperatures of 45° (6°C) but may take longer on the north slope where water temperatures are near 32°F (0°C).

Burbot probably use some of the same overwintering locations as other freshwater species. Although overwintering burbot have not been reported in the refuge, Bendock (1977; 1980) documented burbot in intermittent pools from the Colville River and the lower Sagavanirktok and Kuparuk Rivers. It is possible that similar habitats in the Canning River in the refuge are also used.

Arctic Cod - The arctic cod has been described as a key species in the ecosystem of the Arctic Ocean because of its abundance, widespread distribution, and importance in the diets of marine mammals, birds, and other fish (Craig et al., 1982). It is one of the two dominant marine species in the Beaufort Sea coastal waters, the other being the fourhorn sculpin (Craig, 1984). Arctic cod enter nearshore waters later in the summer as salinities increase. In winter, arctic cod remain under nearshore ice but eventually vacate shallow waters that freeze solid to a depth of about 6.6 feet (2 m). During summer and winter studies Craig et al. (1982) found arctic cod were the dominant species near Flaxman Island. It was also the most abundant species collected in a 1987 study in Camden Bay (Früge, pers. comm.). Studies by the Service show only incidental catches in Beaufort Lagoon (West and Wiswar, 1985; Wiswar and West, 1986). In Oruktalik Lagoon, arctic cod were subdominant numerically to juvenile ciscoes, least cisco, arctic char, and fourhorn sculpin. Migration patterns of arctic cod in the Beaufort Sea are essentially unknown except that in late summer some migrate into coastal waters (Craig et al., 1982).

Arctic cod are sometimes harvested by Kaktovik residents, but in unknown quantities (Jacobson and Wentworth, 1982).

Fourhorn Sculpin - This species is circumpolar in distribution and is typically found in cold brackish to moderately saline water, although sometimes it ascends rivers considerable distances (Morrow, 1980). In Beaufort Sea coastal waters it is one of the two most abundant marine fishes (Craig, 1984). In coastal fisheries studies east of Barter Island this species was the most abundant marine species collected in Beaufort and Oruktalik lagoons (West and Wiswar, 1985; Wiswar and West, 1986; Wiswar et al., In Press). In a 1987 study of Camden Bay the fourhorn sculpin was second in abundance to arctic cod (Früge, pers. comm.).

This species is more abundant in coastal waters than in deeper marine waters, although seasonal onshore-offshore movements do occur (Morrow, 1980). Most of the life history information of this species comes from studies in the Baltic Sea. Spawning takes place in mid-December through January in water 50 to 65 feet (15 to 20 m) deep. Eggs hatch in the spring and fry reach lengths of about 0.78-0.94 inches (2-2.4 cm) by August. Mass movements of fry into shallower waters occur in summer (Morrow, 1980). Fish remain in shallow areas through fall until forced into deeper water by ice formation later in the winter (Craig, 1984).

Fourhorn sculpins are invariably captured in nets by residents of Kaktovik. Most of those captured are probably too small to be valuable as food, although Morrow (1980) states that the species is "edible" and is "used for food in some regions of the arctic coast." Jacobson and Wentworth (1982) stated that at Kaktovik, sculpin "are usually not eaten because they are too boney."

Birds

The refuge provides habitat for at least 163 species of birds (Spindler, 1984). Appendix E lists these species, their status, abundance, and distribution within the refuge.

A total of 108 species have been identified on the north slope (USDI-FWS, 1982). Of these, 58 species are known to breed on the refuge. Bird use of the south slope is less well known. Kessel and Schaller (1960) found 86 species using the Sheenjek River Valley, with 28 species breeding there. Another study (Spindler et al., 1980) lists 86 species using the Firth River-Mancha Creek Research Natural Area. At least 38 species were using this area for breeding.

Migratory birds that use the refuge travel through all continental and some international flyways. For example, in the spring arctic terns return from the Antarctic; golden plovers and buff-breasted sandpipers return from South America; and wandering tattlers return from Central and South America or the Pacific. Yellow wagtails and bluethroats also migrate into the area from Asia or Africa (Gabrielson and Lincoln, 1959; Troy, 1985).

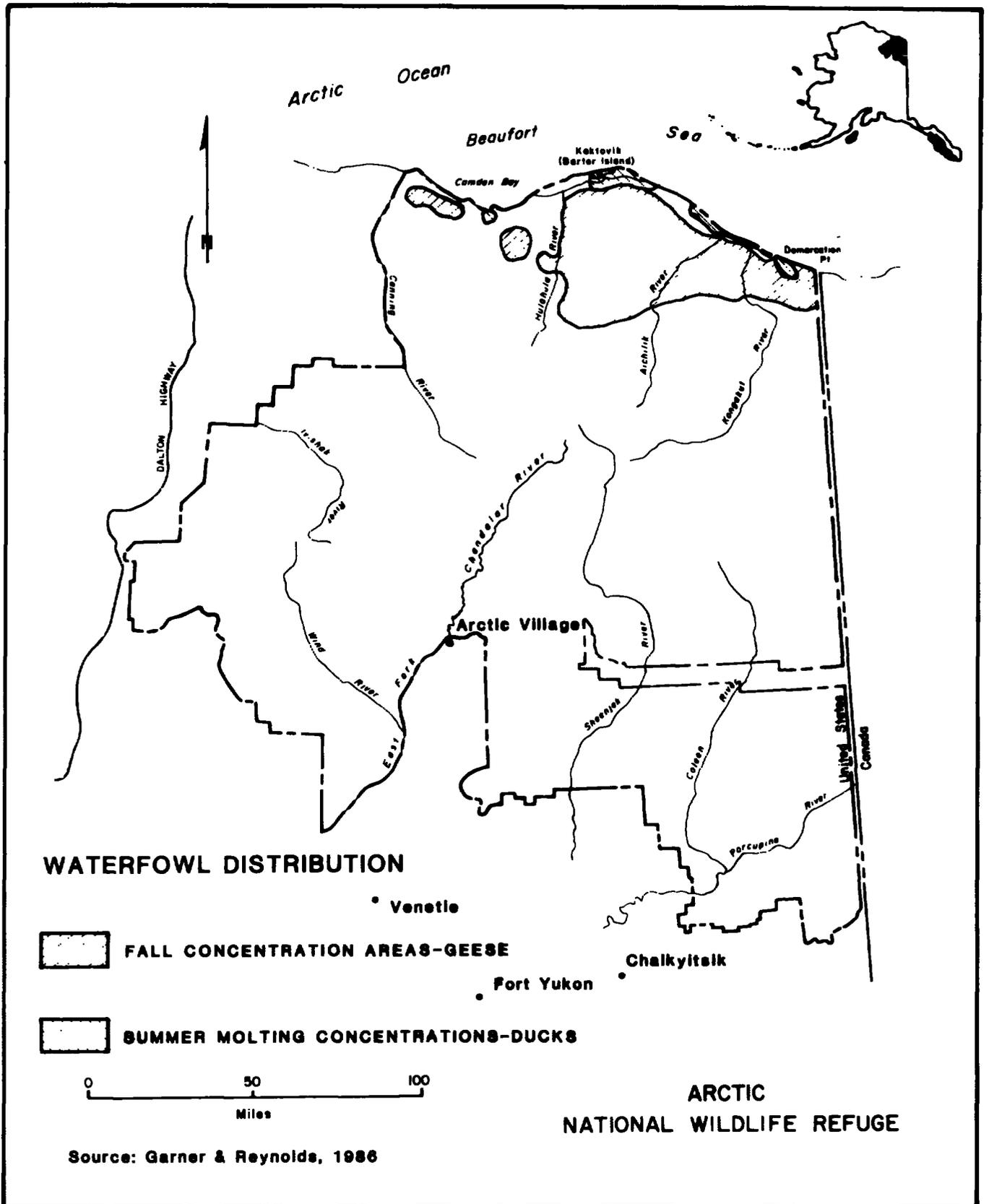
Three resident upland game bird species occur on the refuge. Willow and rock ptarmigan occur and nest throughout the refuge and are the most common. spruce grouse occur only south of the Brooks Range, primarily in the lower elevations along the major drainages.

Swans - Tundra swans are locally common nesters on the northern edge of the refuge's coastal plain. Surveys conducted prior to 1980 found that the number of adults may reach 200-220, with approximately 75-90 cygnets produced during a year (Jacobson, 1979). However, in subsequent years higher numbers have been found, such as in 1984 when a total of 402 swans were counted in June (Brackney et al., 1985). In August of that year 165 cygnets in 62 broods were observed. The mean number of total swans observed from 1981 through 1984 was 443 (Bartles et al., 1983; 1984; Brackney et al., 1985). A few trumpeter swans may nest in lakes on the south side of the Brooks Range but they are not common. Trumpeter swans with young were reported on two lakes along the Porcupine River on the refuge during the summer of 1986 (King, pers. comm.).

Geese - Canada geese, white-fronted geese, and black brant are known to frequent the coastal plain, though not in great numbers. A few white-fronted geese nest occasionally. Canada geese and black brant also may breed on the coastal plain; however, the size of the breeding population is unknown, and the coastal plain is not a major nesting area. Canada geese use the larger river deltas for molting. Brant migrate along the coast using the nearshore tundra wetlands for resting and feeding.

In the fall snow geese and other geese concentrate on the coastal plain. Figure 18 shows important fall concentration areas for geese. Snow geese in particular occur in great numbers during late August and September: at times up to 326,000 snow geese stage on the coastal plain prior to fall migration (Garner and Reynolds, 1986). These geese nest on Banks Island and other areas in the Canadian arctic. They move westward along the coastal plain of northwest Canada and northeast Alaska, and feed in both the upland and coastal tundra habitats prior to beginning their fall flight through the MacKenzie River valley.

Figure 18. Waterfowl concentration areas.



There is no known sport hunting for geese on the refuge. Some geese are taken by subsistence hunters, usually in the spring (June) and fall (August-September). Species commonly harvested include black brant, snow goose, and Canada goose. Black brant is a preferred species. Some eggs of eiders and brant are also taken to a limited extent in the spring.

Ducks - Northern pintail, king and common eiders, and oldsquaw are the most common breeding ducks on the coastal plain. Duck breeding pairs can be seen on most tundra lakes and ponds in early summer. Broods of young appear in July and August. Most duck use occurs in the lagoon areas along the Beaufort Sea coast where post-breeding waterfowl, particularly oldsquaw, are numerous. Diving ducks feed on shrimp and other invertebrates found in lagoon waters.

The coast is a major migration route for a variety of species and is used almost constantly throughout the summer. During the latter part of May, eiders and oldsquaw move east along the coast to breeding grounds in Canada. In June oldsquaw start to move westward to molting areas. As many as 35,000 ducks feed and rest in coastal lagoon waters during molt. Figure 18 shows important summer molting concentration areas for oldsquaw and other sea ducks along the coast. Following molt in late August and early September, oldsquaw continue their migration westward. In late June and early July male eiders take part in a westward molt migration through the refuge's coastal lagoons in flocks of 100 to 200 birds.

Ducks are not as numerous on the south slope of the refuge as on the north slope. Common breeders found on the streams, ponds, marshes, and lakes of the south slope include northern pintail, American wigeon, greater and lesser scaup, oldsquaw and harlequin duck. Although the Arctic Refuge produces several thousand waterfowl annually, it does not produce nearly as many as the adjacent Yukon Flats Refuge.

There is no known sport harvest of ducks on the refuge. The subsistence harvest on the north slope of the refuge mainly includes pintail and oldsquaw. Common and king eider are also commonly harvested. Eggs of oldsquaw are taken to a limited extent.

Seabirds - Seven species of seabirds are known to breed on the refuge's coastal plain: three jaegers (pomarine, parasitic, and long-tailed), two gulls (glaucous and Sabine's), arctic tern, and black guillemot. Jaegers are widely distributed over all habitat types, but their breeding population is comparatively small except in years of high microtine populations. Glaucous gulls and arctic terns are widely distributed, reaching greatest densities in tundra wetlands near the coast. Sabine's gulls and black guillemots are highly localized. The only known nesting areas of Sabine's gulls on the refuge's coastal plain are on the Canning River delta. Black guillemots nest only on the coastal beaches and shorelines. Gulls, terns, and jaegers feed and nest along the coastline and major coastal rivers. (USDI-FWS, 1982).

Shorebirds and Other Aquatic Birds - A large variety of shorebirds and other aquatic species use the coastal plain and other parts of the refuge for breeding, staging, and migration. The pectoral sandpiper and northern phalarope are among the most abundant shorebirds. Sandhill cranes nest along the coastal plain in low numbers.

Upland Birds - In the winter ptarmigan gather in willow thickets in large flocks, often numbering in the hundreds. They are important as food for lynx, foxes, wolverines, wolves, and raptors. Other resident birds include ravens, dippers, chickadees, gray jays, and snowy owls.

Ptarmigan are harvested by local residents in unknown numbers. There is no known sport harvest of ptarmigan from the refuge.

Raptors - Nineteen species of raptors occur on the refuge. The most common is the rough-legged hawk. Other hawks include Swainson's, sharp-shinned, northern goshawk, and the northern harrier. Falcons include the merlin, gyrfalcon, peregrine and kestrel. Golden eagles are generally uncommon, except on the coastal plain during caribou calving season. Bald eagles and osprey are rare. Snowy and short-eared owls and northern harriers are frequently seen hunting over expanses of moist tundra.

All raptor species are thought to be breeders on the refuge, although additional documentation of actual nesting for some species is needed. Inland cliffs such as those along the Kongakut and Canning rivers, on the Porcupine Lake plateau, the Marsh Fork of the Canning River, and the pinnacles along Mancha Creek, in the upper Firth River area, are particularly important as aeries for nesting raptors. Gyrfalcons breed throughout the Brooks Range, though not in high numbers.

Peregrine falcons also nest throughout the Brooks Range and foothills but are more abundant along the Porcupine River (Ritchie, 1984). Two subspecies of the peregrine falcon nest on the refuge. One, the arctic peregrine falcon, is classed as threatened, and the other, the American peregrine falcon, is endangered. The former is found on the refuge's north slope and the latter on the south slope. (See also the discussion under "Threatened and Endangered Species.")

Other Birds - Many passerines, or perching birds, use the refuge's coastal plain during the summer. Erect riparian willow stands support the highest nesting density and diversity of passerine species. Lapland longspurs are the most common of the numerous species of passerine birds that nest on the coastal plain tundra during summer; savannah sparrows are also present, though in smaller numbers (Martin and Moitoret, 1981). Other passerines that use the coastal plain include the common and hoary redpolls, white-crowned sparrow, yellow wagtail, American tree sparrow, snow bunting, common raven, and American dipper.

Large expanses of lowland areas on the south slope are covered with a tussock-heath tundra that provides nesting habitat to longspurs, sparrows, short-eared owls, and many other ground nesting birds. On higher south-facing slopes, above 2,500 feet (763 m) elevation, the tussock-heath tundra grades into dry alpine tundra where water pipits, horned larks, rosy finches, and northern wheatears typically nest. Wandering tattlers are found along rocky streams at these altitudes.

The boreal forest of the south slope extends well into mountain valleys in many areas, providing nesting habitat for robins, thrushes, warblers, kinglets, redpolls, flickers, sparrows, and many other birds. Many of these woodland species continue across the continental divide to nest in willow thickets and cottonwood groves in protected valleys of the north slope.

Terrestrial Mammals

Thirty-six terrestrial mammalian species are found within the Arctic Refuge, including moose, caribou, muskox, Dall sheep, black and brown bear, wolves, wolverine, and other furbearers. These species are listed in Appendix G along with their scientific nomenclature, and general distribution within the refuge.

Moose - Moose are present throughout the refuge and are most often associated with riparian communities along major river systems in the coastal plain, the Brooks Range, and the interior/Porcupine Plateau. These large antlered herbivores are at the northern limits of their Alaska range within the Arctic Refuge. Moose numbers appear to be increasing.

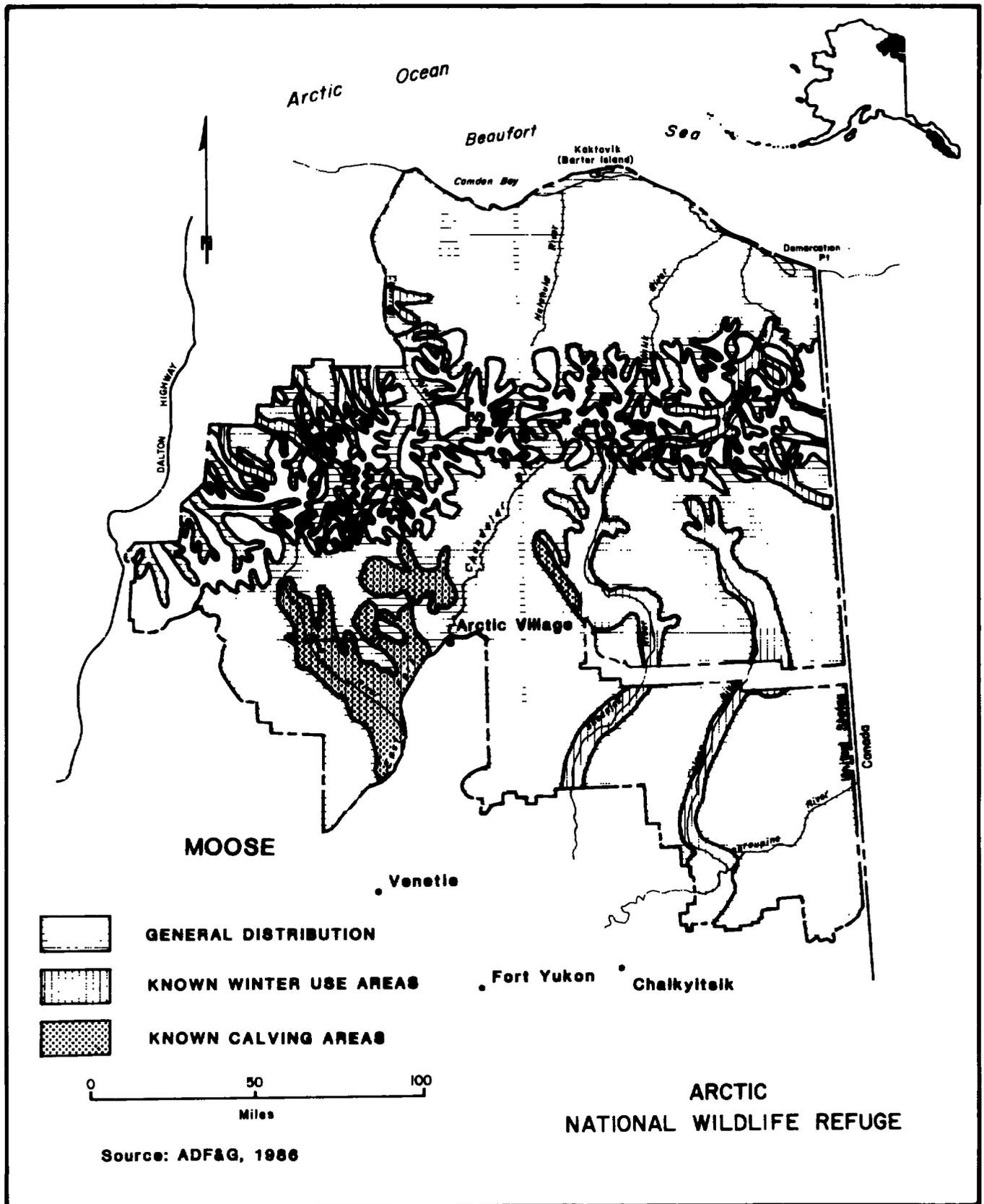
The occurrence of moose in northern Alaska and other northern environments has been considered a recent range extension into previously unoccupied areas (Anderson, 1924; Leopold and Darling, 1953; Peterson, 1955; Barry, 1961; and Kelsall, 1972). This view was disputed by Lutz (1960), who presented a historical record indicating that moose have long been present in these regions and are subject to major movements and shifts in the use of available ranges. Causes for these shifts are poorly understood at the present time. However, habitat changes induced by fire (Leopold and Darling, 1953; Kelsall, 1972) and changes caused by a gradual holarctic warming trend have been proposed (Leopold and Darling, 1953). Recent archaeological evidence support Lutz's theory and indicates that moose have long been present in northern Alaska (Hall, 1973).

Figure 19 shows the general distribution of moose within the refuge. Distribution patterns are best understood on the north slope of the Brooks Range within the refuge. Moose are primarily found in the drainages on the refuge's north slope. Major north slope concentrations occur in the Gilead Creek, Juniper Creek, Kavik River, Canning River and Kongakut River drainages. Spring surveys conducted in 1972, 1974, 1977 and 1984 also have documented the presence of small numbers of moose in the Sadlerochit, Hulahula, Okpilak, Okpirourak, Jago, Aichilik, and Egaksrak drainages.

Moose habitats on the south side of the Brooks Range are ecologically different than those of the coastal plain (i.e., climatic differences, greater diversity and abundance of forage species, etc.). Earlier surveys on the south slope (1972-1981) indicated populations on the upper Sheenjek River and the upper Coleen River as well as smaller numbers on the East Fork of the Chandalar River, Firth River, Old Crow River and Old Woman Creek.

Natural mortality factors affecting these moose populations are poorly documented. Brown bears have been observed killing moose along the Canning River (Quimby and Snarski, 1974). Wolves are known predators of moose and can affect moose populations, particularly when adverse snow conditions occur (Franzman, 1978). The extent and effects of predation on these moose

Figure 19. General distribution of moose.



populations are unknown. The role of other natural mortality factors (parasites, harsh environment, etc.) in the dynamics of moose populations in north slope river drainages is also unknown, but "moose disease" does not occur on the north slope of the refuge (Anderson, 1964 and 1972). The majority of diseases and parasites afflicting moose do not normally cause excessive mortality (Anderson and Lankester, 1974 in Franzman, 1978 and USDI-FWS, 1982).

Moose are harvested by both sport hunters and subsistence hunters in the Arctic Refuge (see the discussions under "Sport Hunting" and "Subsistence" for harvest levels).

Caribou - Barren ground caribou have inhabited northeastern Alaska and the northern Yukon Territory for at least 54,000 years (Harrington, 1977). Caribou are by far the most abundant big game animal on the refuge. Two caribou herds, the Porcupine and Central Arctic, are associated with the refuge. Each herd has specific distributions, movement patterns and herd dynamics. Figure 20 shows the general distribution of caribou in the refuge.

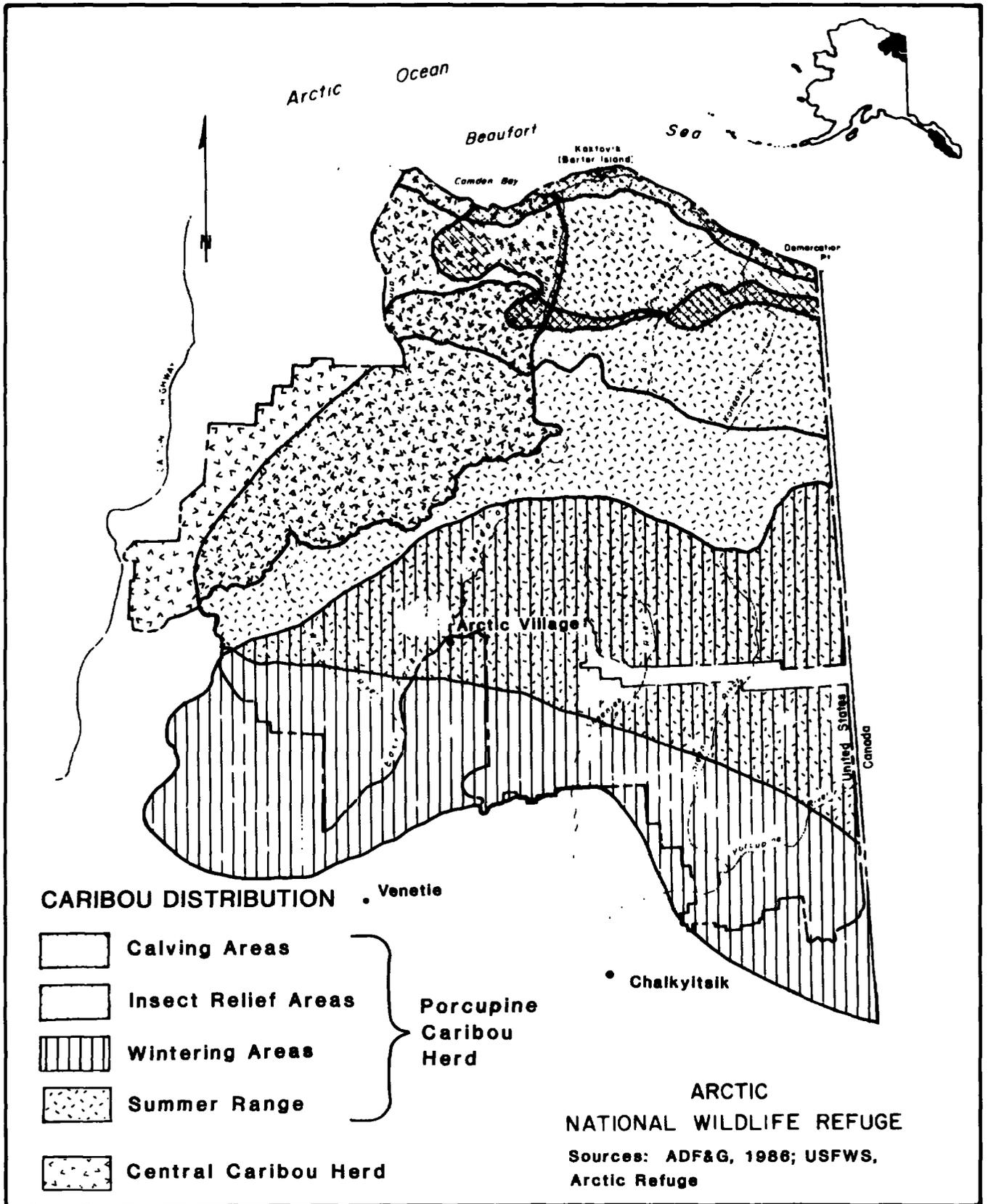
Porcupine caribou herd - The Porcupine caribou herd constitutes the largest population of large mammals shared between the United States and Canada: the herd ranges over 96,100 square miles (249,000 km²) of northeast Alaska and northwest Canada. The refuge's coastal plain provides key calving habitat, while refuge lands south of the coastal plain constitute important summer, fall and winter habitats as well as spring and fall migration routes. Figure 21 shows the range and migration routes of the herd.

The Porcupine caribou herd was estimated to contain 165,000 animals in 1987 (Whitten, pers. com.). The herd has been increasing and is one of the largest in North America (Williams and Heard, 1986). Earlier population estimates for the herd were as low as 101,000 (LeResche, 1972). The lower levels of earlier estimates may reflect a smaller population, less accurate or less complete survey techniques, or a combination of these factors. Caribou populations appear to fluctuate unpredictably over the long term. The long-term maximum and minimum population of the Porcupine caribou herd and the carrying capacity of the herd's range or habitat are unknown.

Large caribou herds such as the Porcupine herd tend to migrate over great distances. This migratory behavior, characteristic of barren ground caribou, apparently enables caribou to use seasonally available forage resources that are often widely distributed (Klein, 1980). Caribou movements are also in response to changing weather conditions, biting and parasitic insect densities and predators. Each caribou herd demonstrates a unique and fairly consistent seasonal movement pattern coincident with annual life cycle events, which over the long term seem to optimize the habitat advantages of a given herd's range (Skoog, 1968; Bergerud, 1974).

The migration to a traditional calving ground in spring is the most consistent of all movement patterns and ultimately involves essentially the entire population. Timing and routes of migration vary annually depending on winter distribution, snow conditions, and the onset of spring weather. During late winter (March/April) wintering caribou usually begin to gradually shift

Figure 20. General distribution of caribou.



northward on the traditional winter ranges in Alaska and Canada. Spring migration usually gets underway when warming spring weather sets in during late April and early May. Pregnant females lead the spring migration northward. Three major migration routes are followed (Figure 21). Caribou wintering in Alaska follow a northeasterly direction, crossing the southern flanks and valleys of the Brooks Range, eventually entering Canada in the vicinity of the Firth River. Caribou wintering in Canada, following two other major migration corridors, also converge in this region. Lesser numbers of caribou wintering in Alaska often move in a more northerly direction, crossing the eastern Brooks Range and move more directly towards the calving grounds. In some years many caribou pass through the first snow-free mountain valleys east of the Aichilik River in Alaska. As spring conditions progress, caribou in the foothills spread northwestward along a broad front, primarily following the major river corridors and associated terraces where snowmelt has advanced.

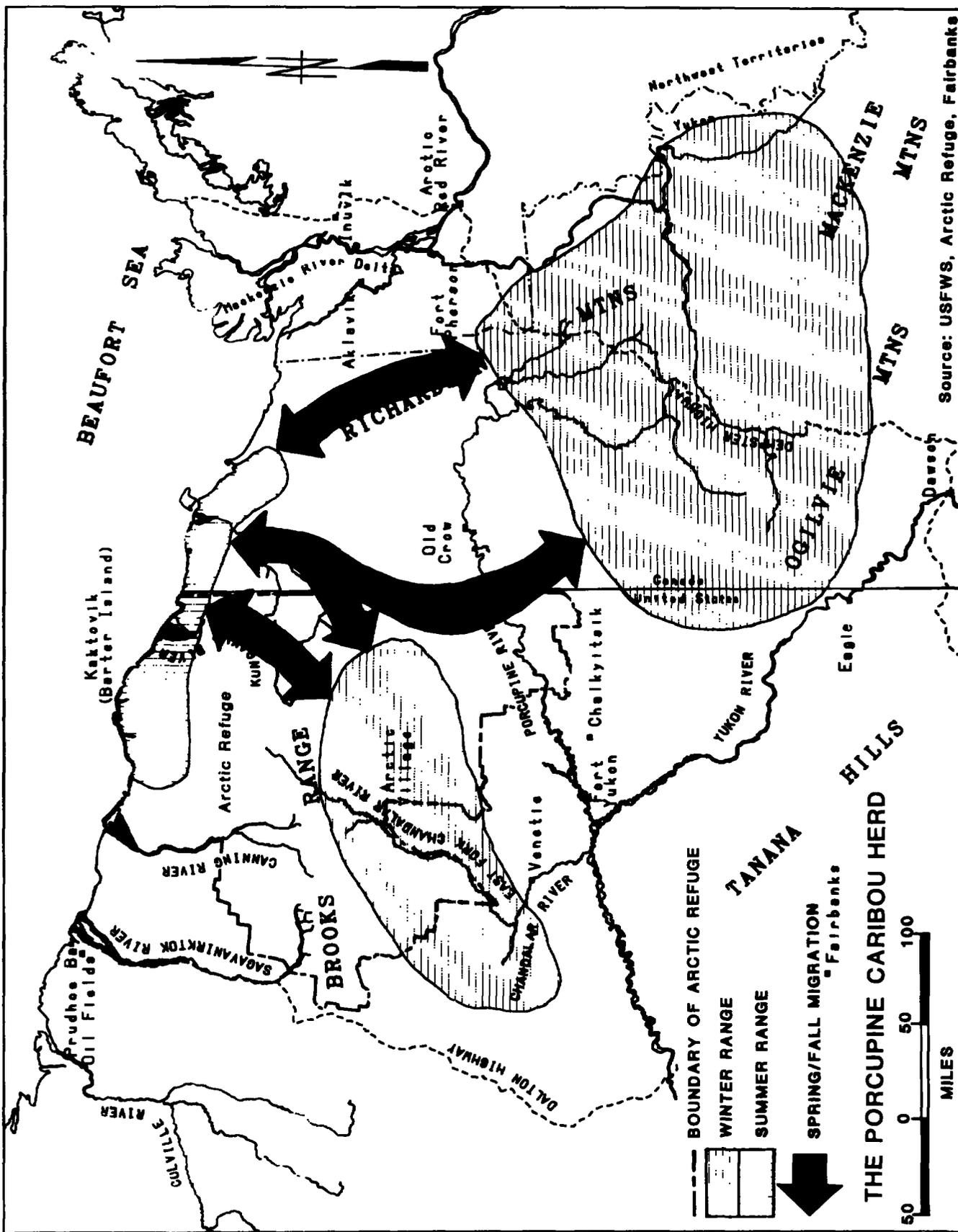
Caribou usually begin to arrive on the calving grounds of the Arctic Refuge in mid- to late May. The traditional calving grounds of the Porcupine caribou herd encompass the arctic foothills and coastal plain from the Canning River in Alaska to the Babbage River in Canada--an area of nearly 8.9 million acres (3.6 million ha). This includes the entire Arctic Refuge coastal plain. From year to year the distribution of caribou on these calving grounds varies considerably, depending upon spring snow melt conditions on the calving grounds and snow conditions along the various migration routes. Most calving in Alaska usually taking place in the area between the Hulahula River and the Canadian border. During years when snowmelt on the coastal plain is early, a broad zone north of the foothills is used for calving. In such years calving concentrations tend to be more northerly, and scattered calving extends to the coast. When spring is late calving is more southerly and easterly, followed by a distinct movement west and northwest.

The open rolling hills and adjacent thaw-lake plains between the Hulahula and Aichilik rivers have supported calving concentrations during 11 of the past 16 years, 1972-1987. The repeated use of this portion of the calving grounds and the generally high reproductive success of cows calving in or near the area implies preference and value over other areas. Thus, these areas are considered valuable and important to the Porcupine caribou herd.

In arctic areas caribou reproduction is highly synchronous. The majority of calving occurs within a 2 to 3-week period, when single calves are born to most adult females (3 years old); peak calving in the refuge occurs between June 2 and 8. Although calving has been observed in a variety of terrain, most calves are born on sedge tussock uplands with patchy snow, where the cows seek suitable vegetation. Predator densities are apparently less in these areas, and subsequently calf survival is better (USDI-FWS, 1982; Mauer et al., 1983; Whitten et al., 1984 and 1985).

Caribou calves are precocious, being able to stand and nurse within 1 hour after birth and follow their mothers within a few hours. The first 24 hours of life are critical, when a behavioral bond is formed between the calf and its mother. Disturbance of maternal groups on the calving grounds may interfere with bond formation and can increase calf mortality.

Figure 21. Porcupine caribou herd range and migration routes.



After calving, small bands of cows with newborn calves gradually merge into larger groups. Yearlings, barren females, and bulls occupying the southern and eastern periphery of the calving grounds begin to mix with the cows and calves, ultimately forming huge post-calving aggregations. By late June or early July large aggregations of caribou on the coastal plain are common. A single aggregation may include 80,000 or more caribou. Post-calving movements show considerable annual variation.

The post-calving season is the low point in the annual physiological cycle when energy reserves of parturient cows are especially low. The stresses of winter, pregnancy, migration, birth, lactation, hair molt, antler growth, and insect harassment draw heavily upon this segment of the population (Dauphine, 1976; White et al., 1975). Access to insect relief habitat and forage resources during this period may be critical to herd productivity.

As the summer progresses, weather conditions promote the emergence of swarms of mosquitoes. Harassment by these insects drive the caribou into densely packed groups and result in their increased movement to areas that provide relief from the insects. The groups usually move rapidly toward the coast, seeking relief on points, river deltas, mudflats, auffs, large gravel bars, barrier islands, and in the shallows of lagoons. Some groups also move to higher elevations in the mountains for relief. In other years there can be a gradual westward shift across the coastal plain and northern foothills.

Usually by early July the post-calving aggregations begin to move rapidly away from the calving grounds in a southeastern direction, crossing the international border from Alaska to Canada. In certain years residual groups numbering up to 15,000 animals have remained on the coastal plain and adjacent foothills and mountains through August. Some aggregations also move directly south and cross the eastern Brooks Range in Alaska. During mid-July to early August portions of the herd in Canada re-enter the refuge, moving in a southwesterly direction south of the Brooks Range. In August the large aggregations gradually dissolve into widely dispersed small groups. An easterly movement from Alaska to Canada occurs during late-August to mid-September. Finally during the fall migration in late September and October, portions of the herd again re-enter the Arctic Refuge.

The fall migration can be a gradual drift towards the traditional winter range and is often accentuated by fall storm systems. Breeding takes place enroute to the winter ranges. By mid-November most of the herd has arrived on its traditional winter ranges. The utilization of winter ranges varies annually. Often up to a third or more of the herd winters in Alaska with the remaining two-thirds spending the winter in Canada. The principal winter range in Alaska is centered in the Chandalar River drainage and extends northeasterly to the Sheenjek drainage and southwestward to approximately the Hodzana drainage. Occasionally, small numbers of Porcupine caribou (up to 2,000 animals) have wintered in the northern mountains and foothills, such as in the Schrader Lake area.

Evidence of human use of caribou in the region of the Arctic Refuge has been found dating back some 27,000 years (Irving, 1968). Remnants of caribou fences and corral structures used by the Kutchin people can be found throughout much of the current southern range of the Porcupine caribou herd (Warbelow et al., 1975). Stone fences used for the deflection and ambush of migrating caribou by Inuit people can be found in the northern foothills of the Brooks Range (USDI-FWS, 1982).

Animals from the Porcupine caribou herd are harvested today in both the United States and Canada. The harvest by individual Native villages is highly variable, depending upon herd movements--the harvest varies greatly from village to village and from year to year within the same village. The total annual harvest for the herd has been estimated at 3,000 to 5,000 animals (LeBlond, 1979). From 1963 to 1985 the annual harvest in Canada averaged approximately 1,700 for the years in which data are available (Yukon Territory Wildlife Branch, unpubl. data). (See the discussion of "Subsistence" for harvests of caribou by Arctic Village and Kaktovik.)

Central arctic caribou herd - The Central arctic caribou herd has been increasing, and in 1985 numbered about 12,000-14,000. Its range is entirely north of the Continental Divide, from the Itkillik and Colville rivers on the west to the Sadlerochit River on the east. The Prudhoe Bay-Kuparuk oilfields and parts of the Trans-Alaska Pipeline System, and Dalton Highway lie within the herd's range. In July 1983 the herd was comprised of 46% cows, 21% calves and 33% bulls (Hinman, 1985).

Several thousand Central arctic caribou overwinter in the mountains between the Canning and Atigun river areas (Whitten, pers. comm.). Central arctic herd cows wintering in the mountains and foothills near the western part of the Arctic Refuge coastal plain migrate north-northwest across the rolling uplands south of Camden Bay to the calving grounds on or near the Canning and Staines river deltas. A northward movement along the Canning River also occurs.

Central arctic herd calving activity has concentrated in two areas: the vicinity of the lower Kuparuk River delta; and the lower Canning River delta. Most years as many as 1,000 cows calve on the Canning River delta on the refuge's coastal plain. Scattered, low-density calving extends as far east as the Sadlerochit River.

After calving some caribou move southeastward to the uplands south of Camden Bay. During the insect season (July) there is often a strong eastward movement along the coastal habitats between the Canning River delta and Camden Bay. An estimated 2,000 to 3,000 caribou of the Central Arctic herd use the coastal plain of the refuge for post-calving and insect relief. In the summer an additional 1,000 animals may be scattered west of the Sadlerochit River and north of the Sadlerochit Mountains. Riparian areas are used as travel corridors as well as important spring and summer feeding areas. In late summer and fall Central Arctic caribou are found scattered across the coastal plain south of Camden Bay, in the foothills north of the Sadlerochit Mountains, and in uplands south of the Sadlerochit Mountains where they remain for the winter. During most winters scattered groups of animals range throughout the coastal plain west of the Katakaturuk River and adjacent uplands

to the south. The number of wintering animals in the refuge ranges from 100 to 1,000.

In addition to harvests by local residents, sport hunting of caribou from this herd is increasing; in the past few years, several hundred animals were harvested near the refuge, west of the Canning River (Whitten, pers. comm.).

Muskox - Muskox were extirpated from the state by the late 1800's. They were successfully reestablished on the refuge in 1969-1970 and are now found throughout the coastal plain of the refuge. The transplanted population has increased at an annual rate of about 26% over the past three years (Reynolds et al., 1985). The latest census, in 1985, located 476 muskox on the north slope of the refuge. Approximately 110 calves were added to the population in 1985 (Reynolds, pers. comm.). Since 1985, muskox have been dispersing out of the refuge and recolonizing adjacent areas. The current number of muskox occurring in the refuge is estimated at around 400 animals (Reynolds, pers. com.).

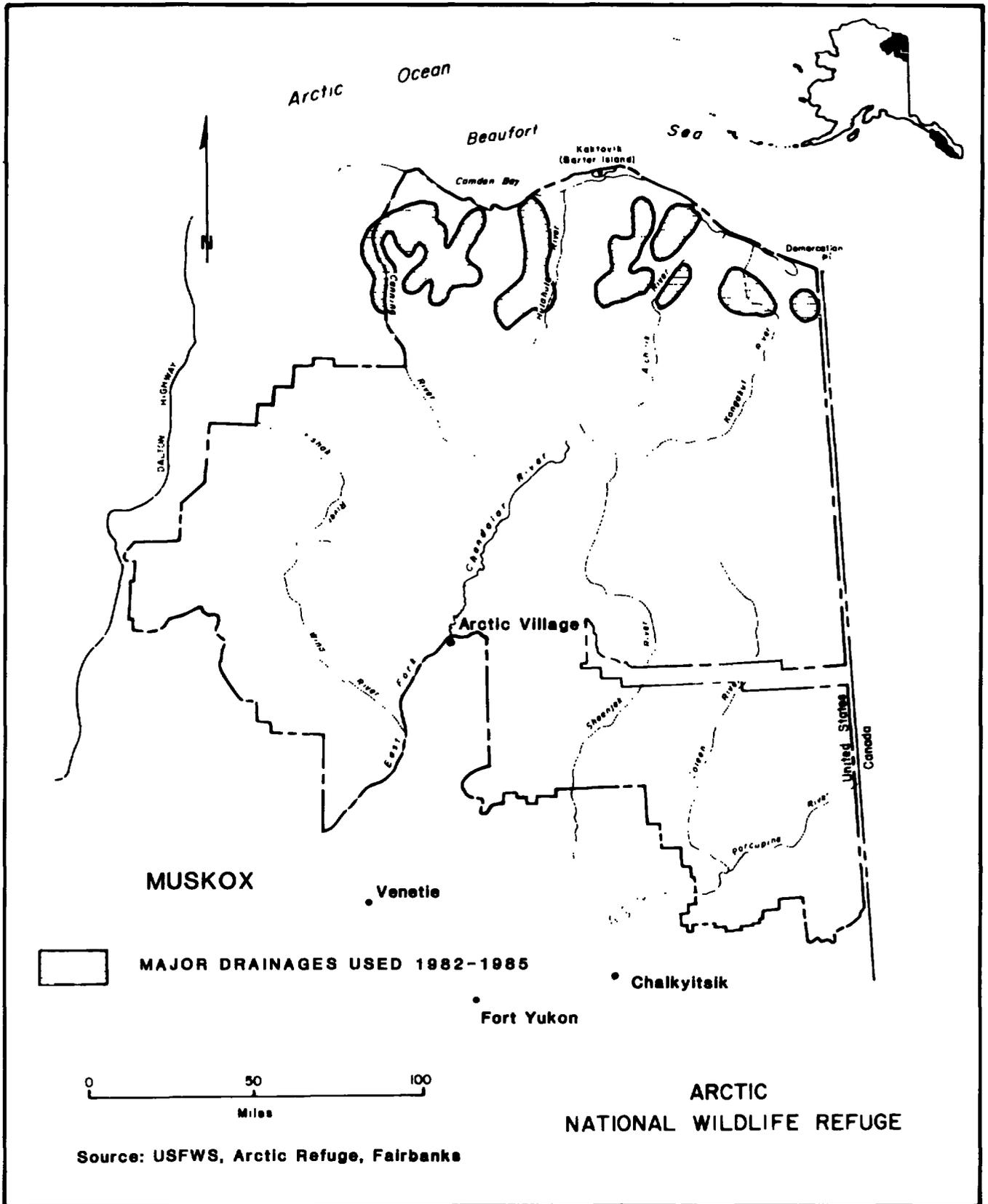
Figure 22 shows the major drainages used by muskox from 1982 through 1985. There are three major areas used by muskox on the coastal plain: the Tamayariak River area; the Sadlerochit River area; and the Angun/Okerokovik River area. Movements of muskox herds are generally north and south along the rivers within these areas, with some east-west movement between the areas, mostly by bulls. The highest productivity among the three groups on the refuge has been in the Sadlerochit herd, where two-year old cows have been observed nursing calves (Jingfors, 1980).

Most muskox are seen in mixed-sex herds of 10-120 animals throughout the year. Herds are largest in April and October and smallest in August during the rut. Bulls are also found in groups ranging in size from two to nine animals, or observed as solitary animals. Unlike cows, many adult bull muskox do not remain with one herd for long periods of time, but move from herd to herd. Small groups of cows and single cows are seen much less frequently (Reynolds et al., 1985).

Muskox have definable herd home ranges and are not migratory (USDI-FWS, 1982; Lent, 1978 in Garner and Reynolds, 1983). Movements are restricted--typically animals move only a few miles per day. Winter distribution of muskox is primarily controlled by distribution of favored forage species and snow cover conditions. Winter tracking data suggest that muskox are very sedentary during winter, probably as a mechanism to conserve energy during severe weather and periods of low food availability. Therefore, they may be especially susceptible to disturbance during the winter months.

Muskox prefer riparian habitats in summer. Willows are preferred food where available, although sedges and forbs make up a high proportion of the total food intake. Studies have shown that many mixed-sex herds use traditional areas year after year. Many of these high-use areas are relatively small, and may contain important habitat components. Movements between areas of high traditional use may also occur along traditional routes.

Figure 22. Major drainages used by muskox, 1982-1985.



Annual mortality, including the harvest of five bulls, was calculated to be 4% in 1984 (Reynolds et al., 1985). Relatively low wolf populations on the north slope in recent years is probably part of the reason for the low annual muskox mortality. Although bear predation has not been documented, bear scavenging on probable winter killed animals and bears chasing muskox have been reported. When confronted by predators and other direct threats, muskox often bunch and assume circular or compact defensive formations. Natural predators include brown bears and wolves.

Muskox have been harvested from the refuge since 1983 in a permit hunt managed by the Alaska Department of Fish and Game (see the discussion under "Sport Hunting" for harvest levels).

Dall Sheep - Dall sheep are the only naturally occurring white sheep in the world. They predominantly occupy mountain habitats. The Sadlerochit Mountains, with an estimated 270 sheep, constitute the northernmost extent of the species range in North America (Smith, 1979).

Figure 23 shows the general distribution of Dall sheep in the refuge. In 1979, about 6,824 sheep were estimated in the original 8.9-million acre (3.6-million ha) refuge (Smith, 1979). An aerial survey of the Hulahula River drainage completed in 1986 recorded 3,193 sheep compared to 1,746 observed in 1976, an apparent 58% increase (USDI-FWS, unpubl. data). It is unclear whether this change represents an increase in the population, a seasonal range shift, or an increase in the survey effort.

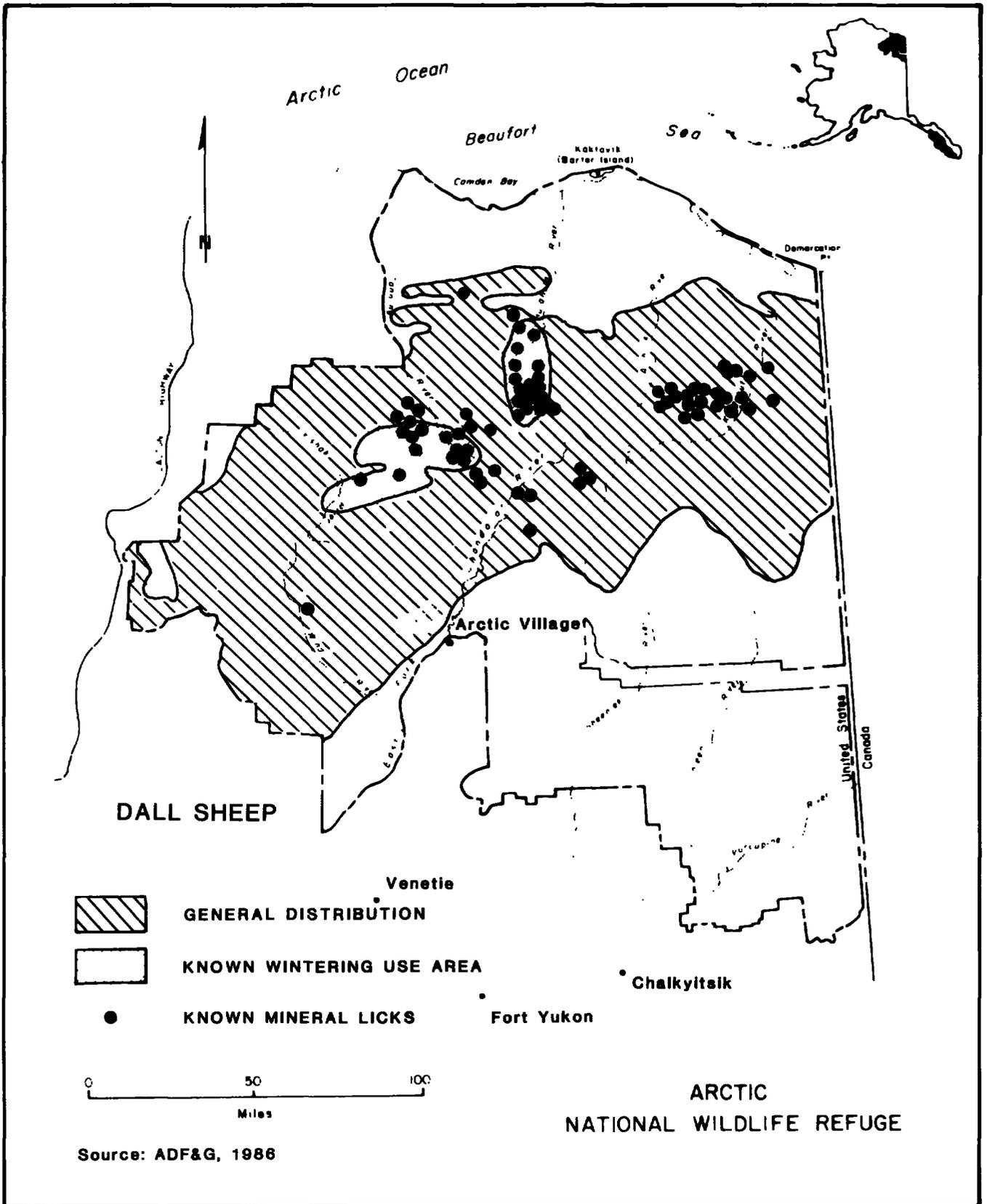
Sheep are loyal to traditional winter and summer ranges and mineral licks. Their activities are confined almost exclusively to the alpine zone where grasses, sedges, various forbs, and willows constitute their primary foods. They breed from late November through mid-December, and lambing occurs from mid-May through mid-June. Winter range, limited mostly by topography, consists of windblown slopes and ridges, often with a southerly aspect. The winter climate is an important mortality factor. Important predators include humans, wolves, and golden eagles.

In north slope drainages sheep are most numerous where northern exposures cause their summer range to be at lower elevations. Soils on these slopes are wet and support ample vegetation. Snow cover in these areas is slight because of frequent winds (USDI, 1974).

During the hottest summer weather, sheep are most frequently seen on green alpine meadows between 3,000 and 4,000 feet (915 and 1208 m), although they may climb above 6,000 feet (1830 m) to reach areas where temperatures are cooler and insects less bothersome. They often lie in the shade of rocky areas near feeding sites. These sheep are climbers, not runners, as are Asiatic sheep, and usually stay near rocky areas--they rarely travel far from cliffs used as escape terrain.

Sheep traditionally move between summer and winter ranges. The exact nature of these movements and consequent effects on the accuracy of survey data are unknown. In early winter as the snowline descends and lowlands become snow covered, sheep move to their wintering grounds on windswept ridges and promontories. With the approach of spring sheep concentrate on south-facing

Figure 23. General distribution of Dall sheep.



slopes in valley bottoms where vegetation first emerges. They may be seen in these valley bottoms at any time of the year, either crossing between mountain ranges or feeding in areas of new plant growth. The animals are seldom far from escape terrain, however.

Dall sheep are harvested for subsistence purposes by Kaktovik and Arctic Village residents. Sport hunting is becoming increasingly popular, and bush aircraft provide the favored means of access (see the discussion under "Sport Hunting" for harvest levels).

Brown Bear - Three bear species occur on Arctic Refuge: brown, black, and polar bear^{a/}. The brown (grizzly) bear is the most widely distributed. This bear is the world's largest extant terrestrial carnivore. The species was once almost circumpolar in range, but today populations have been extremely reduced in most of Europe and much of North America due to direct conflicts with human development.

Brown bear can be found through most of the Arctic Refuge. A total of 540 brown bears are estimated for the entire refuge, with approximately 260 animals north and 280 animals south of the continental divide (H. Reynolds, pers. comm.). Very few data have been collected on brown bear inhabiting the mountains and foothills on the south slope of the Brooks Range within the refuge.

Brown bear are opportunistic omnivores and their habitat use patterns are a reflection of this foraging strategy (Hecthel, 1978 in Reynolds, 1980). Those habitats with abundant food resources are used on an as available basis--brown bear readily shift their areas of use when new food sources become available.

Recent north slope studies have addressed brown bear movement and home range, food habits, sex and age composition, mortality and productivity. In 1973-1975, studies were conducted on brown bear in the Canning, Ivishak, and East Fork of the Chandalar river drainages (Reynolds, 1974, 1976). Garner et al. (1983, 1984 and 1985) investigated den locations, denning ecology, seasonal habitat use patterns, and seasonal interrelationship between brown bear and other wildlife species in the "1002" coastal plain area. North slope brown bear are at the northern extreme of the species' range and are characterized as having low reproductive potential, short periods of food availability, large individual home ranges, and habitats that provide little protective cover.

The breeding season of brown bear normally extends from May through July. Delayed egg implantation takes place and cubs are born about January or early February in winter dens. North slope females younger than 5.5 years have not been observed with cubs, but at least one 23-year old female was observed breeding in 1983, making the approximate reproductive life for some females in the refuge as much as 16 years (Garner et al., 1984). Females breed about every 4 to 5 years, and have an average litter size between 1.6 and 2.3. Low litter size, long reproductive interval, older age at sexual maturity, and short potential reproductive period cause the overall low productivity of brown bear in northeastern Alaska (USDI-FWS, 1982).

^{a/}Polar bear are discussed under marine mammals.

Adult males become active and begin emerging from dens on the north slope of Alaska in mid-April. Females with new cubs are not common until mid-May (Quimby, 1974; Ruttan, 1974; Harding, 1976). Post-denning movements are usually from the den site into the major river drainages and downstream (Ruttan, 1974). Quimby (1974) noted that carrion was an important food source at this time and that bears traveling down the Canning River valley in April and May were primarily feeding on carrion and exposed vegetation.

During the summer months, brown bear move from the major river valleys, dispersing to higher elevations to feed upon various species of horsetail (*Equisetum* spp.) (Curatolo and Moore, 1975; Linderman, 1974; Quimby, 1974; Reynolds, 1979 and 1980). In and adjacent to caribou calving grounds, bear use caribou both as prey and carrion. Bear kill both adults and calves (Lent, 1964; Skoog, 1968; Doll et al., 1974; Reynolds, 1979 and 1980). Preliminary analysis of radio-location data indicates that brown bear appear to shift to coastal areas in June, coinciding with the presence of calving and post-calving caribou (Garner et al., 1983). Brown bear in the southern and western portions of the refuge do not shift movement patterns in response to caribou movements (Reynolds, 1974, 1976; Curatolo and Moore, 1975; and Reynolds and Garner, unpub.).

During July, August and September, brown bear move back into the river valleys and then move upstream in September and October to denning areas (Quimby and Snarski, 1974; Ruttan, 1974; Pearson, 1976). Food during this period is primarily soapberries. Arctic ground squirrels are also exploited by brown bear throughout the summer.

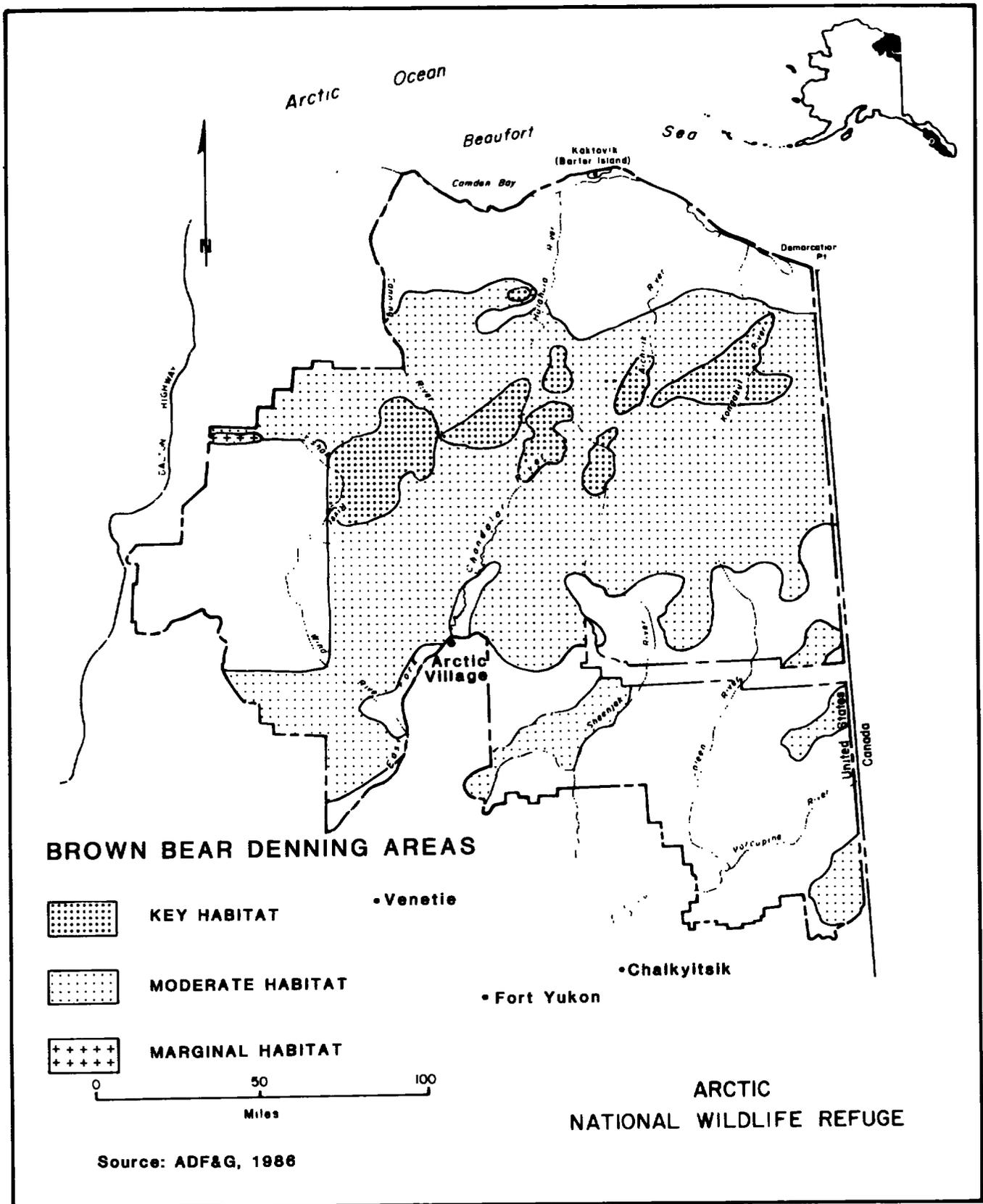
Although the entire refuge is within the brown bear's range, denning occurs mostly in the mountainous portions on steep, south-facing slopes above rivers. Figure 24 shows generally where brown bear den in the refuge. Brown bear usually return to the same area each fall to den. Brown bear in the arctic normally enter dens during the first two weeks in October; however, denning has been recorded as early as September 29 (Quimby, 1974; Quimby and Snarski, 1974; Curatolo and Moore, 1975; Reynolds et al., 1976; Reynolds, 1979 and 1980). Inclement weather, especially snow storms, is considered a major factor in stimulating denning activity (Craighead and Craighead, 1972; Reynolds, 1980). Arctic soils are coarse. Consequently, the top layer must be frozen before dens can be successfully excavated. Dens generally collapse with spring thaw so reuse of dens is rare (Garner et al., 1983, 1984 and 1985).

Pearson (1976) indicated that normal mortality factors such as disease, parasites, and malnutrition have little impact on brown bear. Most mortality factors that have been identified are either intraspecific mortality or human hunting.

Brown bear are subject to both sport and subsistence hunting (see the discussion under "Sport Hunting" for sport harvest levels).

Black Bear - Black bear occur on the refuge only south of the Brooks Range. They normally occupy the spruce forest zone and are seldom seen. Reliable data are not available on densities, use areas and other aspects of their biology in the refuge area. The people of Arctic Village and other villages in the Yukon River drainage take black bear from the refuge, usually incidental to other activities.

Figure 24. Brown bear denning areas.



Wolves - Wolves occur in most of the remote parts of the northern hemisphere that remain relatively undeveloped (Mech 1970, in USDI-FWS, 1982). These predators are found over the entire refuge area, although refuge-wide population figures are unavailable. Wolves may travel great distances. Radio-collared wolves from the Arctic Refuge have been found up to 479 miles (770 km) from their collaring location.

The status of the wolves on the north slope of the refuge is better known than on the south side. Wolves tend to use the foothills and mountains more than the coastal plain, probably due to more consistent year-round availability of prey species there. Some wolves use the coastal plain extensively during summer, with use decreasing once caribou leave the area.

Wolves on the north slope were relatively abundant prior to aerial wolf hunting and predator control practices of the mid-1950's. Though the practices were outlawed by 1970, the abundance of wolves has not returned to previous levels (USDI-FWS, 1982). In addition, other factors such as dynamics of food supplies, rabies, etc., may have also affected wolf populations (Harbo and Dean, 1983). Four packs were identified on the refuge's north slope in 1984, and five in 1985 with a known adult population of 27 and 22 respectively; seven pups were accounted for by late summer in 1984 and fourteen in 1985 (Garner and Reynolds, 1986).

Scat analysis has shown caribou to be the main prey species for wolves, followed in importance by sheep and moose. Small mammals, birds, and ground squirrels are also taken, but probably on an opportunistic basis.

Wolves are highly gregarious and have a highly developed social behavior which centers around the pack. Packs are loosely associated groups, often consisting of family members. Breeding occurs in late winter (February - March). Pups are born in mid-May to early June. By July or August the dens are usually abandoned.

Wolf dens in the arctic usually are found on moderately steep southern exposures where soil is well drained and unfrozen (Stephenson, 1974 in USDI-FWS, 1982). Dens have been found in most river drainages on the north slope of the refuge. No dens have been found on the coastal plain, although they have been found on the coastal plain west of the refuge area.

The number of wolves harvested from the refuge is unknown (see the discussion under "Trapping" for estimates of harvest levels). The actual harvest may be as much as five times the known number taken by trappers due to illegal aerial hunting. The wolf harvest probably accounts for a relatively high proportion of the annual mortality and could be a significant limiting factor on the population (Whitten, pers. comm.).

Wolverine - These members of the "weasel" family (mustelidae) are extremely secretive and generally solitary. The species is circumpolar in distribution, inhabiting the boreal forest and tundra regions. Wolverine may be found almost anywhere on the refuge except in the very highest terrain.

Wolverine are noted for their human avoidance and therefore, are very difficult to study. Few data are available concerning wolverines on the refuge, even on the north slope. Sightings and sign are rare. Only 11 wolverine sightings were made on the coastal plain study area in 1984, despite this being a period of intense field studies (Mauer, 1985). Although data on wolverine are sparse all across arctic Alaska, it is suspected that wolverine densities in some locations west of the refuge are higher than on the refuge (Magoun, 1985).

Wolverine are primarily scavengers, feeding on the remains of animals killed by other predators. Wolverine may rarely kill Dall sheep, caribou, and moose. Other food items include small mammals and birds.

Wolverine breed in late spring-early summer (Rausch and Pearson, 1972 in Garner and Reynolds, 1985). Embryos do not implant until winter, with young being born in early March in snow dens (Magoun, 1979). The young grow rapidly and are usually able to move out of the den within a month. By fall they are nearly full grown. The young are believed to disperse from their mothers during the following spring.

Local residents are known to harvest wolverine, but reliable harvest information is lacking (see the discussion under "Trapping" for harvest estimates).

Other Furbearers - In addition to polar, brown, and black bears, wolves, and wolverine, other refuge mammal species that are valued for their fur include beaver, muskrat, marten, otter, lynx, mink, and arctic and red fox. Population data for most of these species are lacking in the refuge. Small numbers of river otters occur in many of the coastal plain river systems (Whitten, pers. comm.). Beaver, marten, river otter, lynx, and mink are found on the south side of the Brooks Range. They are the most important mammals taken on the refuge for the fur trade.

Of the two fox species, the arctic fox is found on the north slope and ranges inland to the Brooks Range, whereas the red fox occurs throughout the refuge. Arctic fox spend winters foraging on the sea ice and nearshore coastal lands. They feed primarily on the carrion of seals killed by polar bears. They are usually also attracted to garbage dumps or other possible food sources that accompany human activities in the arctic. Denning occurs on land during summer, mostly near the coast. Food in summer consists primarily of lemmings and other smaller mammals, birds and eggs. Residents of Kaktovik harvest arctic foxes in winter in moderate numbers, although specific data are not available.

Small Mammals - Arctic ground squirrel, collared and brown lemmings, and the tundra, singing and red-backed voles are the most common small mammals on the refuge. They occupy a variety of different habitats. All are important in the food webs of the tundra and boreal forest ecosystems. The brown lemming is especially significant in that it is an important food source for several different carnivores on the north slope. Red squirrels and snowshoe hares are preyed upon by raptors and mammalian predators on the southern portions of the refuge. Little is known of their population levels.

The arctic marmot occurs in the mountainous portions of the refuge. The pika is suspected to be present on the refuge, but despite active investigation in localized areas its presence has never been confirmed.

Marine Mammals

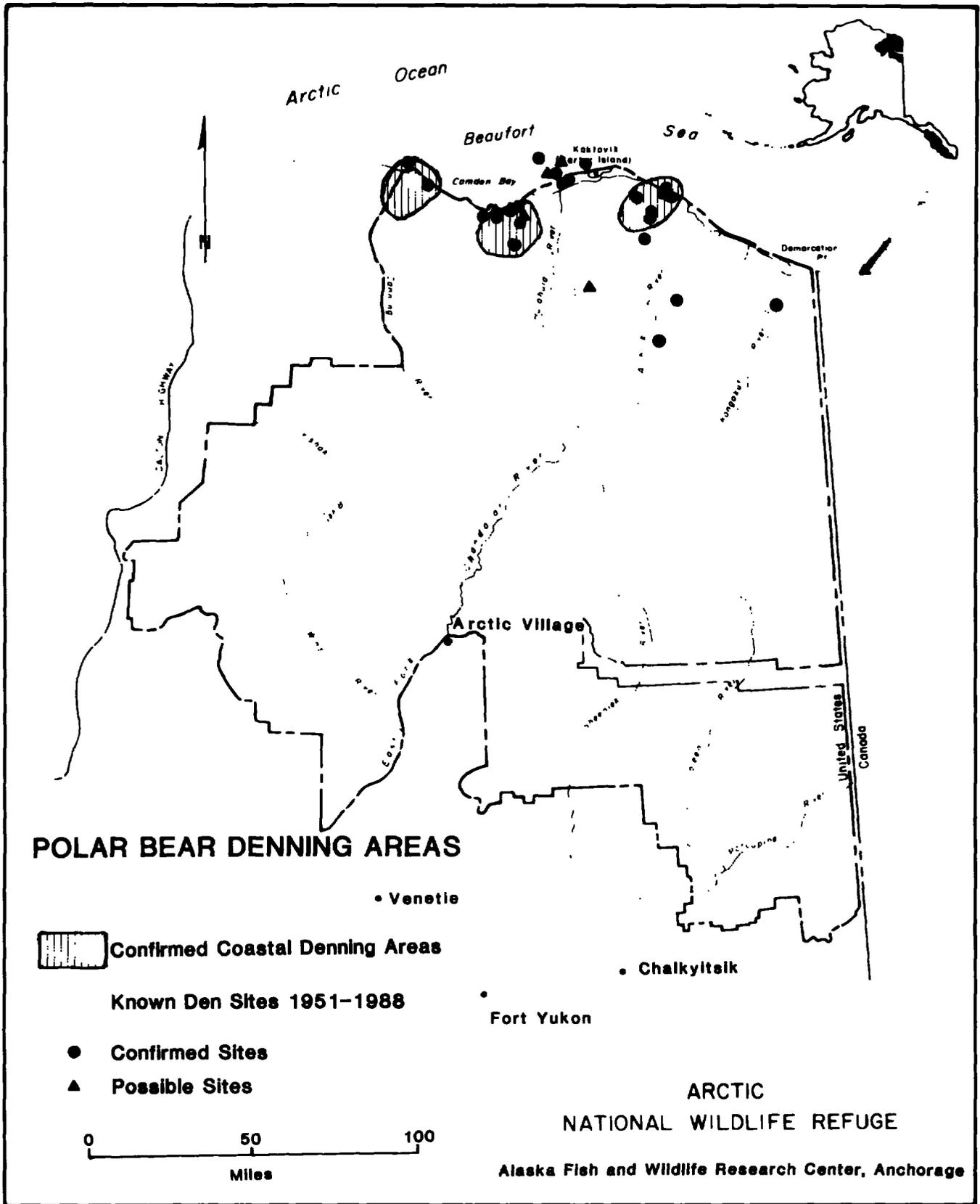
Marine mammals found on the Arctic Refuge and adjacent waters include polar bear, ringed and bearded seals, bowhead and beluga whales. Gray whale, spotted seal (in the spring, summer and fall), and walrus (in the summer) also may be seen, but they are uncommon (Burns et al., 1980 in USDI-FWS, 1982). These mammals occur only in the extreme northern portion of the refuge, primarily the coastal areas and/or adjacent waters of the Beaufort Sea (Arctic Ocean). Most marine mammals have historically been used for food, clothing, manufacture, and crafts by coastal Inupiat people. Today they are still used for food and manufacture of craft items.

Polar Bear - Polar bear are closely associated with pack ice of the Arctic Ocean throughout most of the year. The Beaufort Sea population of polar bear is estimated at 1,800 (Amstrup et al., 1986); however, the Beaufort Sea population may not be a discrete population (Lowry, pers. comm.). Some females move to the coastal areas and occasionally farther inland during October to seek maternity den sites--recapture of polar bear marked by Service biologists in recent years indicates that an influx of females, accompanied by cubs as old as 20 months, and subadult animals coincides with the fall ice-edge advance to the shoreline. Pregnant polar bear, and later their cubs, probably spend more time on the refuge than other segments of the polar bear population. Other groups of polar bear seasonally frequent the coastal periphery of the area. Large numbers of polar bear may occur seasonally along the coast of the Arctic Refuge near the village of Kaktovik where whale carcasses can be scavenged (Amstrup, 1986).

Figure 25 generally indicates where polar bear den in the refuge. Polar bear dens have been found as far as 250 miles (400 km) offshore and 32 miles (52 km) inland. Eighty-seven percent of dens located in 1983-1985 were offshore. The onshore area from the Colville delta to the Canadian border is within the area used by the Beaufort Sea population of polar bear for denning. However, the most consistently used land denning areas studied were within the refuge: from one to three dens were found each year on the refuge between 1981 and 1985 (Amstrup, 1986). A total of eight den locations have been identified on the refuge between the winters of 1981-1982 and 1986-1987. This represents 62% of all known land dens on the Beaufort Sea. The ideal denning sites are riverbanks, draws, and the leeward side of bluffs where snow accumulation is sufficient to support den construction.

Female polar bear that den on land move onshore to seek out den sites in October and November, depending on ice movement and ice buildup in the fall (Lentfer and Hensel, 1980). Denning females give birth to 1 or 2 cubs in December or January, and bears emerge in late March or early April, depending on weather conditions. The female and cubs generally remain near the den, making short forays for 1 to 2 weeks until the cubs gain strength and become acclimated to outside conditions. Soon thereafter, they move to the sea ice to feed on seals. Many females with new cubs concentrate their foraging on the shorefast ice, which varies in width from a few feet to more than 100 miles (160 km).

Figure 25. Polar bear denning areas.



When the nearshore ice breaks up in spring, polar bear move with the sea ice, and many concentrate at the south edge of the pack ice. This position varies seasonally but usually is between the coast and latitude 72°N.

Except for a shore lead, the Beaufort Sea is ice-covered year-round. Open water near shore begins freezing in September or October, and the nearshore ice does not melt until May or early June. Male and non-denning female polar bear inhabit the sea ice throughout the winter. The distribution of polar bear is influenced by the availability of their major prey species, ringed and bearded seals, which concentrate in areas of drifting pack ice (Lentfer, 1971; Sterling et al., 1975). Ringed seals probably constitute 95% of the polar bear diet (Burns and Eley, 1978).

Kaktovik residents annually harvest a small number of polar bear for subsistence purposes. (See the discussion under "Subsistence" for harvest levels.)

Seals - Ringed seals and bearded seals are the only marine mammals found year-round in the refuge area (Lowry et al., 1979 in USDI-FWS, 1982). Presence and location of marine mammals are usually related to the condition and location of the pack ice. In the winter the highest densities of ringed seals occur on stationary shorefast ice, although they can be found around all ice types, including the shear zone and pack ice (Frost and Lowry, 1981). Bearded seals are more often found associated with the moving ocean pack ice. Between the landfast and pack ice, leads, or open water areas, often develop. These zones are important habitat for non-breeding ringed seals and for bearded seals during winter and spring.

Ringed seals are the most abundant and widely distributed of the arctic seals, and are the most abundant seal near the refuge. During the summer and fall when the landfast ice thaws and a wide lead develops near shore, they move out to the edge of the pack ice, although some may be observed in the coastal lagoons and nearshore waters during summer. Seal populations are difficult to estimate because at different times, variable proportions of the population may be in the water and therefore not observable. However, surveys indicate that populations along the refuge's coast are comparable to other areas along the northern Alaska coast, with the Beaufort Lagoon area perhaps being particularly important (USDI-FWS, 1982).

Population data for bearded seal in the refuge area are not available, but this species is known to be much less common than ringed seals. Their numbers vary seasonally with ice conditions. There is a definite movement south through the Bering Strait in the fall for a large segment of the population; during the spring "breakup" there is a movement back north and east along the coast (USDI-FWS, 1982). The Beaufort Sea is thought to be marginal habitat for bearded seals due to the very narrow continental shelf and severe winter ice conditions. Their optimum habitat consists of relatively shallow (less than 328 feet (100 m)) water overlain by moving ice (USDI-FWS, 1982). Therefore, most bearded seals in the refuge area are found in association with nearshore ice remnants in summer and fall.

Whales - Bowhead whales, an endangered species, occur in waters adjacent to the refuge in the spring and fall. The whales winter along the ice edge of the central and southwestern Bering Sea. Spring migration begins in March when leads begin to enlarge. This movement is considerably offshore from the refuge because of the large expanse of shorefast ice. The whales are present in the eastern Beaufort Sea from mid-May through August. In September they begin their fall migration back south to the Bering Sea. This journey often brings the whales very close to the refuge.

The size of the bowhead population is not well known. A 1978 estimate was approximately 2,000; recent estimates place the population near 4,000 (Marquette et al., 1981; Lowry, pers. comm). Breeding is presumed to occur in the spring and summer, with calves being born the following spring during migration. Bowhead whales feed by straining plankton through baleen plates suspended from their upper jaw. There is evidence that whales may use the offshore waters adjacent to the refuge as feeding areas in the fall. In September 1979, a total of 75 individuals were observed in a small area near Demarcation Bay moving in a non-directional manner that suggested feeding (Ljungblad et al., 1980). Most of the whales were observed along the 10-fathom (60-foot) isobath, 5 to 10 miles (8-16 km) offshore.

Beluga whales are also found in waters near the refuge. Their migration patterns are similar to those of the bowhead whale, although during fall migration they tend to remain closer to the ice pack and are therefore farther from shore.

Although whales very rarely enter lagoon waters, they are important in the subsistence culture and economy of Kaktovik. In particular, the bowhead whale is a major subsistence species for the people of Kaktovik (see also the discussion under "Subsistence").

Threatened and Endangered Species--Plants and Animals

Two refuge plant species are under consideration for listing under the Endangered Species Act. One of these is arctic penny cress (Thlaspi arcticum), which is in the mustard family. Another is a fleabane (Erigeron muirii).

Scattered populations of the arctic penny cress have been identified along Marsh Creek and Okpilak Lake and one individual plant was found along the Katakturuk River. Recent investigations by refuge botanists have shown that this plant species may be more widely distributed on the refuge than was previously thought (Raynolds, 1986).

The fleabane has been found on the refuge only on Mt. Copleston near Shublik Springs. A stable population of over 1,000 plants exists there, covering approximately 75 acres (30 ha). Similar habitat in the Shublik and Sadlerochit Mountains have been searched but no new populations have yet been discovered on the refuge.

Two bird species classified as endangered or threatened occur or have occurred on or near the Arctic Refuge. The Eskimo curlew may breed on the upland areas of the north slope. It was once known to nest on the tundra of the Mackenzie Delta of Canada and possibly northeastern Alaska. There is a remote possibility this species may yet exist on the refuge. Occasional reports of sightings reach the refuge office but none have been substantiated to date. A reported observation of the bird was made near the Hulahula River in 1983, but could not be verified by Service biologists (Gallop et al., 1986; Gill and Amaral, 1984).

Two peregrine falcon subspecies occur on the refuge, the arctic and American peregrine falcons. In Alaska, most peregrine falcons nest on ledges of cliffs or bluffs along river courses. The arctic peregrine falcon (Falco peregrinus tundrius), which nests on the refuge's north slope, is currently classified as threatened. Although cliff habitat is not abundant in the Arctic Refuge north of the Brooks Range, a few arctic peregrines have been reported nesting there in past years (Cade, 1960; Roseneau et al., 1976; Amaral, 1985; Amaral and Benfield, 1985). Eyries have historically been used on and adjacent to the coastal plain, including sites along the Canning, Katakaturuk, Sadlerochit, Hulahula, Jago, Aichilik, and Kongakut rivers (USDI-FWS, 1982). Four active nests were located in 1985 on the refuge's north slope. In addition to nesting on the refuge, there appears to be significant movement of arctic peregrine falcons across the coastal plain from late August to mid-September (Martin and Moitoret, 1981; USDI-FWS, 1982). The number and timing of these observations suggest that at least some north slope arctic peregrines migrate along the coast of the Beaufort Sea. The lagoons, river mouths, and bays concentrate shorebirds and waterfowl, which are favored prey of the peregrine.

The American peregrine falcon (F.p. anatum), which nests south of the Brooks Range, is currently listed as endangered. Cliffs along the Porcupine River provide many nesting sites for these birds (Ritchie, 1984).

The bowhead whale is the only endangered mammal that occurs on or near the refuge (see the discussion of marine mammals above).

HUMAN ENVIRONMENT

Cultural and Historical Context

North Slope Pre-contact History

The arctic coast served as a major migration route for early nomadic hunters who migrated to America from Asia across the Bering Land Bridge. However, during the Itkillik glaciation extensive valley glaciers prohibited human occupation of the Brooks Range. As the ice front retreated, people gradually penetrated the area in about 10,000 B.C. They killed animals with arrows, spears, and snares. These early nomads posted lookouts on hilltops where they would wait for days and weeks for the approaching caribou. They built stone-walled shelters to protect them from the wind on these hills. Today, the place to watch for the caribou's approach is still from these hills where the stone wall ruins and the scraps of flint are found.

Two distinct but interrelated groups of Inupiat have made their home on the north slope for thousands of years. The Tagiugmiut have been primarily dependent on a marine economy based on the harvest of sea mammals; the bowhead whaling complex has been the focal point of their social and cultural development. Kaktovik residents primarily descend from this group of Inupiat. The Nunamiut have occupied the inland zone of the north slope. Their central economic pursuits have focused on the harvest of caribou. The two groups of Inupiat have always had strong cultural, social and economic ties, leading some researchers to overlook their distinctions (World Associates, 1979).

Barter Island has been an important trading site since aboriginal times. A large prehistoric village existed on the island, but in cultural memory the site has always best been known as a trading center for Inupiat from both east and west along the coast and from inland areas (Jacobson and Wentworth, 1982). The Inupiat who ultimately established permanent residence on the island after the turn of the century have close ties with relatives at Inuvik in Canada (World Associates, 1979). Additional information on the history of Barter Island is found in Jacobson and Wentworth (1982).

South Slope Pre-contact History

The pre-European contact history of the south slope is still imperfectly known. The area remained essentially ice-free during the last glaciations, and was a logical route for entry of immigrants into the New World from northeast Asia. Dated materials from the adjacent Old Crow Flats in the Yukon Territory suggest that man was present in the area at least 27,000 years ago.

About 11,000 years ago people from the American Paleo-arctic tradition occupied the south slope. This tradition is characterized by microblades (small, parallel-sided stone flakes) made from wedge-shaped cores; various bifacially flaked projectile points and knives; burins (tools used for working bone and antlers); and large core tools.

No known sites of the American Paleo-arctic tradition appear to be more recent than 8,000 years old. This leaves an unfilled gap in the sequence before the appearance of the forest-adapted Northern Archaic tradition about 6,000 years ago. This tradition is known from sites near the refuge at Chalkyitsik and at 12-Mile Bluff near Circle. This tradition is characterized by side-notched projectile points and large irregular, oval or crescentic bifaced tools. Some sites also include microblades, though these were made from a different core type than were the earlier examples. The Northern Archaic tradition is evident until about 4,000 years ago. After this time, the forest adaptation continued in the interior with the developments that foreshadow the Athapaskan cultures of the recent past.

European Contact

Written history of northeastern Alaska spans only a short time. It began in 1826 when Sir John Franklin sailed west from the Mackenzie River to explore Alaska's eastern arctic coast. A Hudson's Bay Company expedition and other explorers followed and extended Franklin's route west.

In about 1854, whaling vessels began rounding Point Barrow and sailing east to hunt in the Beaufort Sea. The whalers permitted their vessels to become frozen in protected shore ice where they remained over winter in order to be on the Beaufort whaling waters early in the open water season. The ships also served as bases for inland exploration and stopped at many points along the arctic coast where both coastal and inland people traded for goods.

Written history south of the Brooks Range began in about 1844 when Hudson's Bay Company traders descended the Porcupine River to its confluence with the Yukon River in search of trade routes. Alexander Hunter Murray established a Hudson's Bay Company trading post, called Fort Yukon, at the confluence in 1847. This was the first European settlement in the area. The fur trade quickly became the dominant element in the region's economy and established what is considered today as a traditional vocation for Natives on the south slope. The traders were followed into the region by the first missionaries in the early 1860's.

After Alaska was purchased by the United States from Russia in 1867, the Hudson's Bay Company was forced to vacate its holdings. The post was subsequently moved back to Canadian soil at Old Ramparts on the Porcupine River. The Alaska Commercial Company assumed operations at Fort Yukon after the Hudson's Bay Company departed.

In the late 1800's gold prospectors explored the south slope but found little evidence of gold. The gold rush prospector was followed within the current century by the scientific prospector, methodically searching for signs of valued minerals and petroleum. Recreational hunters, fishermen, hikers and others have also been visiting the area in increasing numbers.

Archaeological Sites

There are over 300 known archaeological sites on the Arctic Refuge. An examination of a map of the sites in and near the refuge would show substantial concentrations of such sites at several locations either actually in the refuge (as at the Upper and Lower Ramparts of the Porcupine River), or immediately adjacent to it (as at Galbraith Lake on the Trans-Alaska Pipeline route). The distribution of currently known sites is probably a function of past archaeological field work rather than a true distribution of archaeological sites. Based on a comparison of the amount of work done within the refuge and comparable areas along the pipeline or in the National Petroleum Reserve-Alaska there may be several thousand substantial archaeological sites within the refuge that have yet to be discovered.

Population Patterns

Five communities are in or relatively close to the Arctic Refuge and use the refuge for subsistence and recreational purposes: Arctic Village, Chalkyitsik, Fort Yukon, Kaktovik, and Venetie. These communities are the focus of this section. Refuge lands currently are used most heavily by Kaktovik and Arctic Village residents; residents of Fort Yukon, Venetie, and Chalkyitsik use refuge lands to a lesser extent (Whitten, pers. comm.). In addition to people living in the communities, there are several families who live outside the villages on refuge lands.

As of 1970 more than 80% of the people associated with the refuge area were Native. Kaktovik, an Inupiat community, is located on Barter Island on the shore of the Beaufort Sea. The other four communities (Fort Yukon, Chalkyitsik, Arctic Village, and Venetie) are all Athapaskan villages located on the south side of the Brooks Range. These villages share similar languages, heritages and lifestyles.

Kaktovik Population Trends

Table 6 indicates the 1980 population levels of the five communities, and forecasts future growth of the communities. About 70% of Kaktovik's population is Inupiat. The 1980 Census showed a population of 165, a 34% increase over the 1970 count. Recent population increases in Kaktovik are attributed to former residents returning from Barrow in response to improved housing and employment opportunities. A North Slope Borough census in July 1982, showed a growth surge to 189 local residents, primarily from construction activities. The adjacent U.S. Air Force Distant Early Warning (DEW) Line Station houses an additional 58 people. The present population is projected to nearly double by the year 2000. Stability of Kaktovik's population seems assured by strong cultural and family ties (Jacobson and Wentworth, 1982).

South Slope Community Population Trends

The population density of this area has always been fairly low. Nelson (1973) describes the difficulty of establishing historical population figures:

Table 6. Population forecasts for communities in the Arctic Refuge area, 1980-2000.^{a/}

<u>Community</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Arctic Village	111	115	127	140	155
Chalkyitsik	100	95	96	98	103
Fort Yukon	619	753	886	1,042	1,208
Kaktovik	165	232	281	310	343
Venetie	132	144	157	171	186

^{a/} Population data for 1980 are from the U.S. Census. The population forecasts for Kaktovik are from Alaska Consultants, Inc., 1983; all other forecasts are from Louis Berger and Associates, 1982.

Sources: U.S. Bureau of Census, 1981; Louis Berger and Associates, 1982; Alaska Consultants, Inc., 1983.

Shimkin (1955, p.223) estimates the population of Fort Yukon and the entire surrounding area, including Venetie, Chalkyitsik, Birch Creek, and all outlying settlements, at 500 in 1850. The number plunged just after white contact, to about 230 in 1879, then recovered to 500 again by 1930, and in 1947 rose to 600.

Darbyshire and Associates (1979), relying on several sources, estimated a 1970 population of 1,250 for an area that includes the four communities as well as Rampart, Stevens Village, Beaver, Circle, Central and Circle Hot Springs. "Recent population trends for the region indicate that the area is growing slowly...Although the accuracy of the census in remote areas can be questioned, the figures can be considered a rough indication of the general trend of modest growth which has occurred in recent years" (Darbyshire and Associates, 1979).

This conclusion is further borne out by the Interior Transportation Study, which states:

From 1970 to 1980, Upper Yukon River communities experienced growth rates of between 1.7 and 3.9% per year with notable exceptions of Beaver (-4.2%) and Chalkyitsik (-3.1%). For these two communities outmigration is not expected to continue, and moderate growth is expected. Elsewhere in the region growth is expected to remain relatively constant at historical rates of about 2% per year, with the exception of Fort Yukon, which is expected to become the seat of government in the future and is assumed to have growth rates double that (Louis Berger and Associates, 1982).

Fort Yukon - Located at the confluence of the Yukon and Porcupine rivers, 140 air miles (225 km) northeast of Fairbanks, Fort Yukon is the largest village of the Kutchin or Gwich'in Athapaskan people. The community has historically served as a meeting place for the Gwich'in Athapaskans and neighboring peoples. More recently, it has served as an important trading, supply, transportation, and administration center.

Since the late 1800's, Fort Yukon census figures show a pattern of steady growth, with the exception of a significant and short-lived increase between 1960 and 1970. The 1980 census for Fort Yukon showed 619 residents. A local door-to-door census in November 1983 showed 643 residents (Filip, pers. comm.).

Arctic Village - This village is located on the east bank of the East Fork of the Chandalar River, 6 miles (10 km) southwest of the junction of the Junjik River in the Brooks Range. It is 100 air miles (160 km) north of Fort Yukon.

Arctic Village has always been a traditional community of Neets'aiti Gwich'in Athapaskans. The term "Neets'aiti" means "strong people." Once semi-nomadic, they were known for trading babiche (moose or caribou hide cut into strips) and wolverine skins with the Barter Island Inupiat for seal oil and seal skins. Arctic Village and their Venetie neighbors chose, under terms prescribed by the Alaska Native Claims Settlement Act, to retain and jointly manage their lands.

Arctic Village grew from 30 people in 1930 to a 1980 population of 111 (John, pers. comm.). The community's population was projected to increase to 140 by 1995 (Louis Berger and Associates, 1982). Between the 1960 and 1980 census counts there was a difference of one person, with a slight drop for the 1970 count.

Chalkyitsik - Chalkyitsik is located on the Black River, 45 miles (70 km) northeast of Fort Yukon and 170 air miles (270 km) from Fairbanks. The village began as an important summer fishing site. Traditionally it was a Dr'aanjik Gwich'in (Black River) village, though today it is a mix of Gwich'in people from the Black River, Yukon Flats, Chandalar and Porcupine River areas (Nelson, 1973).

The community's population nearly doubled between the 1960 and the 1970 census, then dropped back nearly 25% by the 1980 census to 100 residents. Louis Berger and Associates (1982) forecast the population to remain at about its current level through the year 2000.

Venetie - Venetie is located on the Chandalar River, about 45 miles (70 km) northwest of Fort Yukon and 140 air miles (225 km) north of Fairbanks at the confluence of the Chandalar River Main and East Forks. It is an original Neets'aiti Gwich'in village. The village was settled in 1900. Under terms of the Alaska Native Claims Settlement Act, Venetie and their cultural neighbors in Arctic Village chose to retain all the lands of the former Venetie Indian Reservation (Kent, pers. comm.).

Venetie has consistently grown in size since 1960. The total population is now 180 (Venetie Village Council, pers. comm.), which is six people short of the population forecast for the year 2000 by Louis Berger and Associates (1982).

Sociocultural Systems

The Inupiat and Athapaskan people of the region have used the lands and resources of the refuge for many centuries. Although social, cultural, and economic changes have been occurring throughout this period, recent decades have brought accelerating change.

The single most important factor in the recent acceleration of sociocultural change has been the Alaska Native Claims Settlement Act (ANCSA) of 1971. This statute created village and regional corporations, providing financial assets and village-owned lands for the Native peoples of the region.

Other important factors are also affecting village residents. The Molly Hootch court decision, for example, directed the State of Alaska to provide public school facilities for all villages having at least eight high school students. Federal programs are providing modern housing, and satellite communication is bringing increasing numbers of telephones and televisions into the villages.

Subsistence and Economic Orientation

Cash and subsistence economies are becoming more closely interrelated in the Native societies, as are traditional and western social structures. Natives are participating within both cash and subsistence economies. Variations in lifestyles depend on the degree to which subsistence activities are pursued as opposed to wage activities (ISER, 1978).

Kaktovik - Although Kaktovik received early exposure to whalers and traders, cash did not become a fixture in the local economy until 1923 when the establishment of a permanent village resulted from construction of a fur trading post. However, "the basic economy remained one of subsistence harvesting until after World War II" (Alaska Consultants Inc., 1983).

It was in 1947, when the U.S. Air Force built the airstrip and DEW Line Station, that dramatic economic and other changes began to occur in Kaktovik. Since that time, largely due to Prudhoe Bay oil development, the economy of Kaktovik has become one of mixed cash and subsistence components. Passage of the ANCSA and formation of the North Slope Borough were also important factors. For the foreseeable future, cash and cash-earning activities will be inextricably entwined with seasonal subsistence activities (Worl Associates, 1979). Worl Associates (1979) further noted that the interrelationship of the economies has facilitated the survival of the Inupiat culture and that cash income opportunities have remained compatible with the subsistence system. It is very difficult to quantify the importance of subsistence in Kaktovik at present. An important aspect of subsistence is the deep social and cultural value placed upon traditional harvesting by Kaktovik people.

South Slope - Acculturation of the Gwich'in Athapaskan people has occurred rapidly, changing the pure subsistence economy of the region to a mixed cash/subsistence base. Subsistence activity in the Yukon-Porcupine region clearly remains an important component in the lives of its residents, though it is intermixed with the cash economic system there as well (ISER, 1978).

Community Infrastructure

Infrastructure is the basic underlying framework or support system for a community. Included within the concept are local government, housing, education, health services, local transportation, water and sewage systems, solid waste disposal, police and fire protection, and communication systems. The infrastructure of the five communities is highlighted here.

The communities in the region generally have similar infrastructures including housing, educational facilities, public health facilities, post offices, small airports, dock facilities along the river, satellite communication facilities (telephone and television), and electricity. Nearly everyone has electrical service, but water systems are not always available. Both Kaktovik and Fort Yukon are incorporated as cities, though the other villages are unincorporated with traditional tribal forms of government.

All of the communities are eligible for land entitlements under the Alaska Native Claims Settlement Act. Venetie and Arctic Village chose to select the lands from the former Venetie-Chandalar Native Reserve and are thus not eligible for any other land selection. Kaktovik is within the North Slope Borough, and many villagers are shareholders in the Arctic Slope Regional Corporation (the Native regional corporation) and the Kaktovik Inupiat Corporation. Fort Yukon, Arctic Village, Chalkyitsik, and Venetie are within the region covered by Doyon, Limited, the regional Native corporation. The nonprofit Tanana Chiefs Conference, Inc. serves these four villages, providing numerous social services under contract to the federal Bureau of Indian Affairs (BIA).

Kaktovik^{a/}

The City of Kaktovik was incorporated as a fourth class city in March 1971, then reclassified to a second class city in September of the same year. There is a community service building that serves as the city office, a multi-purpose public meeting facility, and a recreation center. The North Slope Borough Department of Public Safety provides police protection with two officers assigned to Kaktovik and the immediate vicinity. A public safety building was built in 1980, and a fire station was built in 1983. The North Slope Borough Health and Social Services Agency completed a new health clinic in 1984 as part of a seven village project. The Harold Kaveolook School, operated by the North Slope Borough School District, was completed in 1982. The school has a 10-member teaching staff, serving grades 1-12.

^{a/}The information in this section was mostly taken from Alaska Consultants, Inc. (1983).

In 1982, commercial land use included the Kaktovik Inupiat Corporation office and store, an air taxi office, and a bunkhouse operation for transients. There were 61 housing units, excluding itinerant quarters and US Fish and Wildlife Service facilities.

The Kaktovik Power Plant, operated by the North Slope Borough Department of Public Utilities, was completed in 1981. It contains five diesel generators with a combined total rated capacity of 655 kilowatts. Fuel is delivered to Kaktovik by barge once a year. Fuel delivery by large aircraft supplements the barge delivery.

The North Slope Borough Department of Public Utilities operates both the drinking water and sewage systems. Village residents use honeybuckets with a bag and drum gathering system; disposal of the drums poses a growing problem. Graywater from sinks and tubs in all buildings except the school complex is discharged directly onto the tundra under or by each building. Solid waste is hauled to the Distant Early Warning Line Station's solid waste disposal site by the Borough.

Commercial passenger transportation in and out of Kaktovik is possible only by air. The same is true for most of the freight, although barge service is usually available in late August depending on weather conditions and distance of the ice pack from shore. A 5,000-foot (1,500-m) gravel runway, built by the U.S. Air Force, is capable of handling fully loaded C-130 Hercules aircraft. Air taxi services fly between Kaktovik to Deadhorse, Nuiqsut, Barrow and Fairbanks. They provide scheduled flights and charter service for passengers and freight. Trucks and three-wheelers are used in the village, and snowmachines are used during the winter as the principle transportation for hunting, fishing and trapping. An extensive North Slope Borough road development project is in progress in Kaktovik. An offshore ice road from Prudhoe Bay to Barter Island has potential for transportation of goods.

The Arctic Slope Telephone Association Co-op, Inc. (ASTAC) provides local dial telephone service for Kaktovik customers as well as long-distance direct dial connections through ALASCOM satellite circuits. Television is transmitted via ALASCOM satellite and rebroadcast in the village by local mini-transmitters.

Fort Yukon^{a/}

Fort Yukon is the administrative, transportation, communication, and economic center for the Yukon Flats region. It was incorporated as a second class city in 1959. The city has a mayor-council form of government with a city manager, and retains a traditional tribal government that is recognized under the Indian Reorganization Act. The local village corporation is called Gwitchyaa Zhee Corporation.

Fort Yukon community facilities include: a community center; museum; fire department; police department and Mayor's office. Other government offices include: regional school district headquarters; National Guard Armory; state health and social services; court system; University of Alaska; Department of

^{a/} Most of the infrastructure information on four south slope communities is from Caulfield (1983) and Darbyshire and Associates (1979).

Fish and Game; and Division of Aviation. Federal agencies with offices include the U.S. Air Force and Bureau of Land Management. The U.S. Fish and Wildlife Service has a cabin and storage facility, and the U.S. Public Health Service runs a health resource clinic. The Tanana Chiefs Conference also has a regional office in Fort Yukon.

The Yukon Flats School District operates the Fort Yukon School. Eleven teachers instruct students in grades 1-12. Increased emphasis on compulsory education played a part in families remaining in Fort Yukon rather than establishing seasonal camps. The University of Alaska offers courses through the Cross-Cultural Education Development program (X-CED) and a branch of its Rural Education Center.

Fort Yukon Utilities provide electric power. Bulk oil products are sold by a Chevron USA Inc. distributor. Water and sewer systems are partially state funded. Water is drawn from a seep well into a storage tank where it is chlorine treated, with plans pending for fluoride treatment. It is then pumped throughout the community via underground circulating pipes to metered individual residences and business consumers. Fire hydrants are also connected to the system. Septic systems are used for sewage on individual lots. State and city offices are hooked up to a main system.

Between 1972 and 1982, 45 new houses were built in Fort Yukon. Housing is in short supply and there are very few vacancies. New housing applications with the Interior Regional Housing Authority now await designation of suitable land.

Fort Yukon is the transportation center for the Yukon Flats region with primary access by air and water; there is no highway or railroad access. Two commercial airlines provide seven weekly flights to and from Fairbanks and outlying communities. Charter service is available for landing on floats, wheels, or skis. The Fort Yukon airport has a 5,019-foot (1,530-m) gravel runway. There is also an unmanned Federal Aviation Administration station. Over the next five years the State plans to relocate the existing float plane area, on the south end of Hospital Lake, approximately 0.25 mile (0.4 km) northwest of its existing location. Yutana Barge Lines of Nenana and the Yukon Navigation Company of Circle provide barge service during the summer months. River boats are used for subsistence and smaller watercraft provide summer recreation for local residents. Trucks and three-wheelers are common forms of transportation. Most of the city's streets are graveled, and there are trails to Birch Creek, Chalkyitsik, and Venetie. Winter travel is also by snowmachine and dog sled. In addition to the U.S. Post Office, Fort Yukon has telephone service and satellite cable television.

Arctic Village

Arctic Village is unincorporated and shares with Venetie a tribal council organized under terms of the Indian Reorganization Act to manage former reservation lands. Arctic Village also has a traditional village council that manages local affairs. Community services and businesses include: post office; village-owned store; community center; washateria; generator building; community-operated lodge; National Guard Armory; petroleum products distributor; village council office; Episcopal church; and a mission house. The community has 39 housing units, of which 35 are occupied. The U.S. Public Health Service operates a health resources clinic. The Arctic Village School,

part of the Yukon Flats School District, employs four teachers and three aides for grades 1-12. Electric power is provided to most households in the community by the Arctic Village Utility.

A water tank system providing lake water to homes had trouble with freezing and was discontinued in 1979. Water is currently hand-carried from the Chandalar River and Lilly's Lake. Solid waste is disposed of at a nearby dump, while sewage is collected in honey buckets. Outhouses are also used.

Primary transportation to Arctic Village is by air with five scheduled flights weekly. The community's 5,200-foot (1,600-m) gravel runway, owned by the tribal government, has recently undergone major improvements. A gravel road connects the community with the airstrip and extends east to the base of a nearby ridge. In the summer of 1985 a state grant was used for road upgrading and new access roads to houses. A trail/road to Old John Lake and a winter trail to Venetie also exist.

Arctic Village businesses and some homes have telephones. Television was introduced to the village in 1981, and nearly all households now have a television set.

Chalkyitsik

Chalkyitsik is unincorporated and governed by a traditional village council. Community facilities include the village council office, a post office, Chalkyitsik Native Corporation Store, three churches, and a new community center, built in 1985. The Public Health Service runs a health resources clinic. The Yukon Flats School District operates the Chalkyitsik School; two teachers and three aides teach students in grades 1-12.

In 1985 there were 33 housing units in the community. Most homes use propane for cooking. Since completion of a state-funded generator in 1983, all homes have electricity. All homes heat with wood. A state-funded bulk fuel storage facility was completed in 1984. Water is hauled year-round from the Black River and stored in a centrally located pumphouse. The school and several other buildings are connected to a sewage lagoon; most homes use outhouses. A landfill is used for solid waste.

There is no highway or railroad access to the community. Two commercial air services provide five scheduled flights weekly between Chalkyitsik and Fort Yukon, with scheduled bush flights and charter service also available. The 3,000-foot (900-m) runway is surfaced with a combination of dirt and gravel. Over the next five years the State has proposed to improve the airstrip. Demientieff Barge Lines provide 2 to 3 calls each season, depending on water levels (Kent, pers. comm.).

Chalkyitsik has a post office, satellite television and newspaper service. Telephones are now available to every home that wants such service.

Erosion, stream overflow and flood hazards continuously threaten the village. In the past 30 years more than 50 feet (15 m) of riverbank has washed away (Kent, pers. comm.).

Venetie

Venetie is managed by a traditional village council. As noted previously, the community shares a tribal government with Arctic Village for management of former reservation lands.

Local businesses and community services include Dan's Trap'n'Trade, the Venetie Native Store, a community hall, an Episcopal Church, a post office, and a regional Rural Education Attendance Area (REAA) office; a new community hall is being built. The village government presently operates a health clinic at the old village site; a new clinic is scheduled for construction at the new village site. The Venetie school is in the Yukon Flats School District. Four teachers and four aides teach students in grades 1-12. A new elementary school building is planned by the Yukon Flats School District as an addition to the existing high school building.

Occupied housing units increased from 29 in 1982 to an estimated 53-55 in 1985 (Venetie Village Council, pers. comm.). Many of the homes are new 30x40 foot (9x12 m) log structures built under a Bureau of Indian Affairs housing program. All houses are heated with wood and have electricity, running water and indoor plumbing with individual septic tanks and drainfields.

Utilities are provided by Venetie Community Power. Since 1980, a village generator grant project and electrification distribution project have been completed. Bulk storage capacities are 22,000 gallons (83,000 L) for oil and 2,000 gallons (7,600 L) for gasoline. A 325,000-gallon (1,231,000 L) water storage tank and distribution system serves each house.

Eighteen weekly commercial flights and a bush schedule and local air charter service provide access to the area. A 4,400-foot (1,300-m) gravel runway is maintained. There are graveled streets throughout the village with a winter trail to Arctic Village and to Fort Yukon (Kent, pers. comm.). No year-round land vehicle access routes exist. The village is presently seeking a new airport and street improvements.

The village has telephone, television and postal service.

Economic Conditions

The economies of the five communities in the Arctic Refuge area are highly dependent on subsistence resources and the infusion of "outside money" to drive local systems. No property or local taxes exist. State and federal governments support much of the basic community infrastructure. Such subsidies allow a resident to exist on a mixed cash and subsistence economy. Subsistence activities are a key part of the economies of all the communities in the area. This section, however, focuses on the cash economy of the area. The important role of subsistence is discussed later in this chapter.

Employment

Kaktovik - In August 1982 there were 67 annual, full-time jobs in Kaktovik, including local people working at Prudhoe Bay and at the Distant Early Warning Line Station. This does not include on-base Distant Early Warning Line employees. Over half of the jobs counted were governmental and,

except for three federal (Postal Service and U.S. Fish and Wildlife Service) and two city jobs, all government employment was with the North Slope Borough. The Kaktovik Inupiat Corporation is an active force in the community's non-government business activities.

Petroleum activities employed the second highest number of Kaktovik residents, including three in the Prudhoe Bay area and an annual average of four in oil and gas exploration on the Arctic Refuge coastal plain during 1984 and 1985. While it was operating, the nearby KIC #1 Exploratory Well on village corporation land employed several residents. Contract construction work offered approximately 7 jobs, and transportation, communications and public utilities accounted for 6. Based on annual averages in 1982, the Kaktovik Inupiat Corporation Store had 3 employees as did operation of a construction camp and a fuel delivery service.

The North Slope Borough not only provides jobs associated with services, such as education and utilities, but also those in temporary construction projects for capital improvements. The availability of these construction jobs is highly variable.

Fort Yukon - Continuing state and federal financial support is vital to the Fort Yukon economy. Government is the primary employment source in Fort Yukon, although to a lesser extent than in the rest of the Yukon Flats region. An Air Force station, built in 1955, figured in the community's economic development, until about two years ago when it was largely automated. The importance of the station to the local economy is now negligible. Native organizations are the second largest employer, followed by private business and Alyeska Pipeline Service Company. The 100-day summer tourist season provides income to some local residents.

Arctic Village - Full- and part-time employment is limited in Arctic Village. Jobs in the community include: postmaster; school and village maintenance workers; health aide; store manager and assistant; three bilingual teaching aides; tribal council office manager; school cook; and National Guard Armory caretaker. The U.S. Fish and Wildlife Service employs an information technician for the Arctic Refuge in the community. A few people find seasonal employment in fur trapping, construction projects, wildlife surveys, firefighting and in state-funded social aid projects (Caulfield, 1983).

Chalkyitsik - Full-time employment in Chalkyitsik year-round includes a postmaster, store manager, clerk for the village council office, and one health aid. Two health aid alternates work on call. During the school year two teachers, a school maintenance person, a cook, and two bilingual instructors are employed. Seasonal jobs include firefighting, construction and trapping. A recent increased interest in trapping as a source of income is apparently due to a combination of high fur prices and a lack of alternative employment opportunities (Caulfield, 1983).

Venetie - More residents work seasonally as firefighters in Venetie than at any other single occupation. According to the Venetie Village Council (pers. comm.), 50 people work as firefighters, 10 work for the State, 2 for the federal government and 2 in retail business.

Income

Much of the cash income supporting the south slope economy is generated through seasonal wage labor, such as firefighting for the Bureau of Land Management. In contrast, Kaktovik's economy has more opportunities to employ people year-round. Cash income is an essential part of the mixed economic lifestyle of the area. Expenditures are necessary to successfully compete for subsistence resources. Requirements include firearms, ammunition, fishing gear, snow machines, boats, and associated materials and maintenance.

Kaktovik - Household income levels at Kaktovik are close to the statewide average recorded by the U.S. Census, but purchasing power is diminished by high living costs, including housing and air freight. Fuel oil for heating costs \$105.60 for a 55-gallon drum (\$1.99 per gallon), and the average Kaktovik home uses between 4 and 5 drums per month during the winter. Adding delivery costs, the average family spends close to \$500 per month for much of the year just to heat their homes.

Fort Yukon - Fort Yukon has the highest projected per capita income of the four south slope communities. Seasonal labor, such as fire fighting for the Bureau of Land Management, accounts for a significant part of the cash income supporting the economy. Other cash income comes from trapping, transfer payments and unemployment insurance paid to residents who leave a wage job for subsistence activities.

Arctic Village - Arctic Village has the lowest per capita income of the four communities (\$7,475) (Louis Berger and Associates, 1982). Unemployment insurance payments, social security benefits, and state welfare payments for Arctic Village residents provide income to many residents. Some households receive foodstamps, which contribute to household buying power. Some people also sell firewood, while others make income through the sale of beadwork and handicrafts. Fur sales from trapping is important income for many households (Caulfield, 1983).

Cost of living in Arctic Village is substantially higher than Anchorage, Fairbanks or Fort Yukon. One study reported prices of food items to be 72% higher than those in Anchorage. The logistics of importing food also severely limits the availability of fresh produce, and shipping delays often result in the store only having a few canned and dry goods on the shelves at any time (Caulfield, 1983).

Chalkyitsik - As noted previously, opportunities for year-round employment in Chalkyitsik are limited. Besides seasonal jobs, some households also rely on income from the sale of firewood in winter and equipment construction, such as snowshoes, sleds, boats, clothing and beadwork. Other income sources are Alaska State welfare payments, unemployment compensation, and social security payments.

Venetie - Income sources are also limited in Venetie. Caulfield (1983) reports firefighting and construction as major sources of wage income, with handicrafts and beadwork providing important sources of income for some families. Alaska State welfare payments, unemployment compensation, and social security benefits provide residents with other sources of income.

Future Economy

Kaktovik's economy would probably experience major changes if significant oil and gas deposits are discovered on the Arctic Refuge coastal plain and those deposits are exploited. Employment and income would probably increase (Clough, Patton and Christiansen, 1987). Otherwise, the present economic trend would probably continue.

In terms of future growth, the most recent comprehensive economic analysis for the south slope area (Louis Berger and Associates, 1982) does not indicate any substantial change in the economic status quo. Other studies have similar findings (CH₂M Hill, 1977; ISER, 1978; Darbyshire and Associates, 1979).

Access and Transportation

Figure 26 indicates popular access points into the Arctic Refuge. There are no roads into the refuge. The Dalton Highway (i.e., the Trans-Alaska Pipeline System Haul Road) comes within about 3 miles (5 km) of the refuge, near Atigun Gorge. The highway is presently open to public use south of Atigun Pass; north of this point use is by permit only. Some visitors probably access the refuge from the road, although the Service has no data on how much use occurs. In the future the State could remove use restrictions and open the road part or all of the way to Prudhoe Bay.

Light aircraft, boats and snowmobiles are the primary means by which visitors reach the Arctic Refuge. Nonlocal users charter air taxis to fly into the refuge, primarily from Fairbanks, Kaktovik or Fort Yukon. In recent years, Audi Air, Inc., operating out of Kaktovik, has provided the majority of the charter air service north of the Brooks Range in the refuge. Residents from the local communities also sometimes charter an aircraft to reach hunting areas. On the north slope, wheeled planes land on river gravel bars, sandbars, and other flat areas. The Peters-Schrader Lakes area is accessed by float plane. Float planes are more commonly used, however, on the south slope than on the north slope.

Boats are used for fishing, sight-seeing, hunting, and travel between villages. Residents on the south slope predominantly use boats to reach the refuge. However, boat use is generally light on refuge rivers. Public use data indicate that the Porcupine River is the most heavily used river. Inflatable rafts, inflatable motorized boats, jet boats, and conventional outboard skiffs are all used where water depths permit.

Three-wheelers are commonly used in and around all of the communities, and by Kaktovik residents on coastal beaches. Snowmachines are the most popular means of travel during winter. They are primarily used by local residents to access the refuge for subsistence purposes or to travel between villages.

Subsistence Uses

The information contained in this section was used in the Alaska Lands Act Section 810(a) evaluations that were done for each of the management alternatives in Chapter VI. The Arctic Refuge is primarily used for subsistence by residents from the communities of Kaktovik, Arctic Village, Fort Yukon, Chalkyitsik, and Venetie. Most of the following subsistence information was taken from Worl Associates (1979), Jacobson and Wentworth (1982), Caulfield (1983), and Pedersen et al. (1985).

Subsistence uses are defined in the Alaska Lands Act as:

...the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade.

Under this definition all harvest of refuge resources by local residents potentially qualifies as subsistence use. Lacking further definition, all local harvests will be considered for purposes of this plan to be subsistence--the terms "subsistence" and "local harvest" are synonymous.^{a/}

General Overview of Subsistence Uses in the Refuge Area

As noted previously in this chapter, subsistence plays an important role in most local residents' way of life. Inupiat and Athapaskan peoples have hunted and fished in and around the Arctic Refuge for thousands of years. Many residents in the local communities are highly dependent upon a subsistence lifestyle, although acculturation of villages into mainstream United States society has necessitated new definitions of the term. Modern Euro-American ethics of consumptive and nonconsumptive uses sometimes clash with local interpretations.

In Alaska, subsistence has a cultural dimension as well as as a solely economic one. The cultural importance of subsistence to the communities of the north slope is demonstrated by the degree to which the cultural value is defended when subsistence is threatened, and the amount of money that is often spent in pursuing subsistence activities, often at a net monetary loss. For instance, a whaling captain may spend several thousand dollars per year to support crews and whaling activities. Similar cultural values for the Athapaskan people of the southern refuge area have been documented by Caulfield (1983).

The nutritional component of subsistence is also important. In Kaktovik, for instance, commercially available foods are expensive and their availability cannot be relied upon. Stocks at the local store are irregular, and shipments often arrive damaged or spoiled. The greater nutritional value of local subsistence foods over store-bought food also has been documented (Jacobson and Wentworth, 1982).

^{a/}Trapping is discussed in more detail in this chapter under "Economic Uses."

Local residents harvest a variety of resources in and near the Arctic Refuge, including fish, caribou, Dall sheep, moose, muskox, seal, grizzly and black bear, various furbearers (e.g., muskrat, wolf, wolverine) small mammals (e.g., ground squirrel, hare) and vegetation (e.g., berries, firewood). Subsistence harvest level information is sketchy for most of these resources, particularly for resources harvested on the south side of the refuge.

Figure 27 shows the general locations of where local residents harvest resources in or near the Arctic Refuge. As the map depicts, most of the refuge is used to harvest at least one subsistence resource. It is important to note that the harvest locations shown on this figure, and the subsequent figures in this section, are not static. Fish and wildlife populations will shift use areas as habitat conditions change, thus altering harvest patterns. Patterns also may change as population levels of given species fluctuate, either naturally or due to other causes. Other factors, such as weather conditions, water levels, and economic considerations, also influence the location of harvest activities.

Kaktovik^{a/} - Kaktovik residents fish, hunt and trap for subsistence purposes on the Arctic Refuge. Jacobson and Wentworth (1982) reported northern pike, least cisco, and arctic cod being harvested by Kaktovik residents, but in unknown numbers. Grayling are traditionally caught by Kaktovik residents in overwintering areas on the main stem of the Hulahula River. Griffiths et al. (1977) reported that approximately 570 arctic ciscoes and arctic char were taken by Kaktovik residents one summer. Cannon and Hachmeister (1986) estimated 1,000 to 2,000 arctic ciscoes and 2,000 to 4,000 arctic char were harvested by Kaktovik residents in or near the refuge in 1985. During the period July 1985 to July 1986 a total of 513 geese, 251 ducks, and 686 ptarmigan were harvested by Kaktovik residents (Pedersen, pers. comm.). Kaktovik residents have annually harvested from 25 to 75 animals from the Porcupine caribou herd (Pedersen and Coffing, 1984). The annual harvest of animals from the Central Arctic caribou herd by Kaktovik residents was earlier estimated to be 25 to 75 (Pedersen and Coffing, 1984). This harvest occurs along the coast during the summer when residents can travel by boat, and inland in the fall and spring when snowmachine travel is possible. In 1985-1986, Kaktovik residents took 135 caribou. In 1986, Kaktovik residents harvested an estimated 235 caribou, 37 sheep, 4 moose, 1 muskox and 1 brown bear (Alaska Department of Fish & Game, unpub. data).

Kaktovik residents harvest polar bear and bowhead whale in or near the refuge. Annual subsistence harvest of polar bear by local residents was as high as 23-28 in 1980-1981; at least one polar bear was confirmed as being taken in each of the winters since then, with three bear being taken in 1985-1986 (Schliebe, 1985; Jacobson and Wentworth, 1982; USDI-FWS, unpubl. data). Residents hunt for bowheads in the fall and usually take 1 or 2 whales annually. The harvest is regulated by quota.

^{a/} For more detailed information on Kaktovik subsistence activities, see Jacobson and Wentworth, 1982.

Figure 27. Composite of general areas where local residents harvest resources in or near the Arctic Refuge.

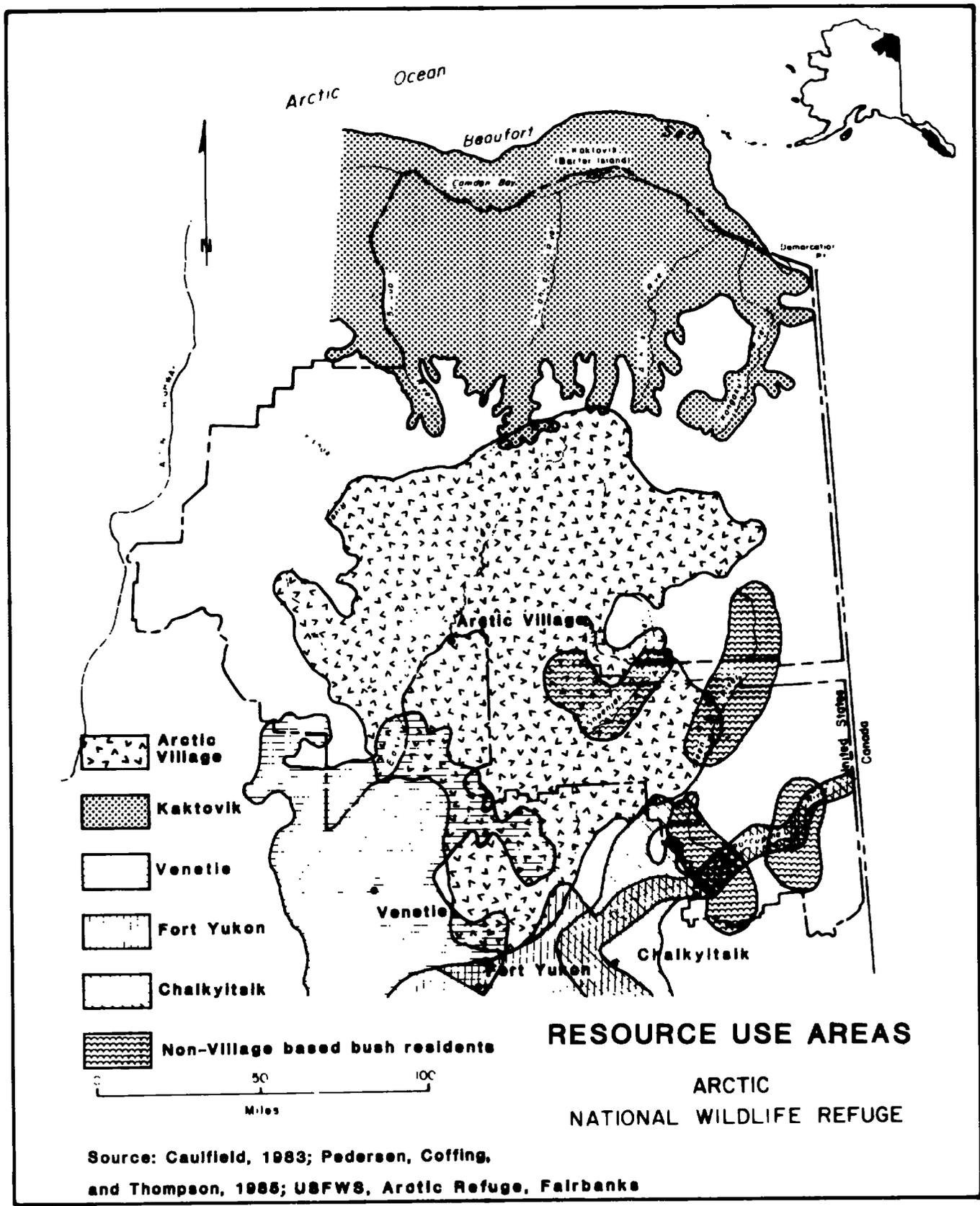


Figure 28 shows the general areas where local residents harvest resources on the refuge. Kaktovik residents focus their activities primarily on the coastal plain and the Hulahula and Sadlerochit drainages. The refuge staff notes that the coastal wetlands and lagoons from the mouth of the Okpilak River to Nuvagapak Lagoon receive the heaviest use by Kaktovik. Several subsistence fish camps are located within this area. In terms of adult participation, fishing ranks second to caribou hunting in importance as a subsistence activity (Craig, 1987). Residents fish the lagoons along the Beaufort Sea coast for arctic char and arctic cisco, the Hulahula River for arctic char and arctic grayling, and Lakes Peters-Schrader for lake trout. The Canning River drainage is known for its variety of fish, being the only river in the refuge where Kaktovik residents find both broad whitefish and burbot. The portion of the river most often used is from the mouth up 10 to 15 miles (16 to 24 km) on the main channel. Broad whitefish are also caught in lakes between the Canning and Tamayariak rivers, and in the mainstem of the Tamayariak. The Kongakut River has also historically been fished for arctic char, but not commonly in recent years.

Table 7 shows the annual cycle of subsistence activities for Kaktovik residents on the Arctic Refuge. Jacobson and Wentworth (1982) note that the yearly cycle of subsistence activities has followed the same general pattern since the early part of this century. They note also that techniques have changed and the relative emphasis on species sought has also changed. For instance, bowhead whales were not hunted in historic times at Kaktovik until 1964. Also, seals were hunted more commonly for dog food prior to the mid-1960's when dog teams were still commonly used.

Overall participation in subsistence activities is greatest during spring and summer months. At this time family hunting, fishing and gathering are predominantly oriented towards the coastal area, when caribou, birds, eggs and ocean fish are most available. Bowhead whales are hunted in the fall. Sheep hunting is reserved for periods of snow cover due to improved access by snow machine. Seal and caribou are important year-round.

The snow season greatly expands the range of land used for subsistence. Snow cover permits snowmachine travel across the tundra of the coastal plain and access to the camps along the Hulahula and Sadlerochit drainages. During this time "the mountains" are the single most important place for subsistence activities. April and May are considered the best months for traveling overland by snowmachine because there is still snow on the ground and also many hours of daylight (Jacobson and Wentworth, 1982).

The colder weather of late August signifies the time to begin whaling. Whaling occurs only in the fall at Kaktovik, not during the spring as in other north slope villages. At the beginning of the fall migration, hunters may travel as far as 20 miles (30 km) out to sea to hunt whales; later, in September, the whales pass closer to shore and may be taken within 2 miles (3 km) of Barter Island. Hunting can last several weeks before whales are

Figure 28. General areas where Kaktovik residents harvest resources.

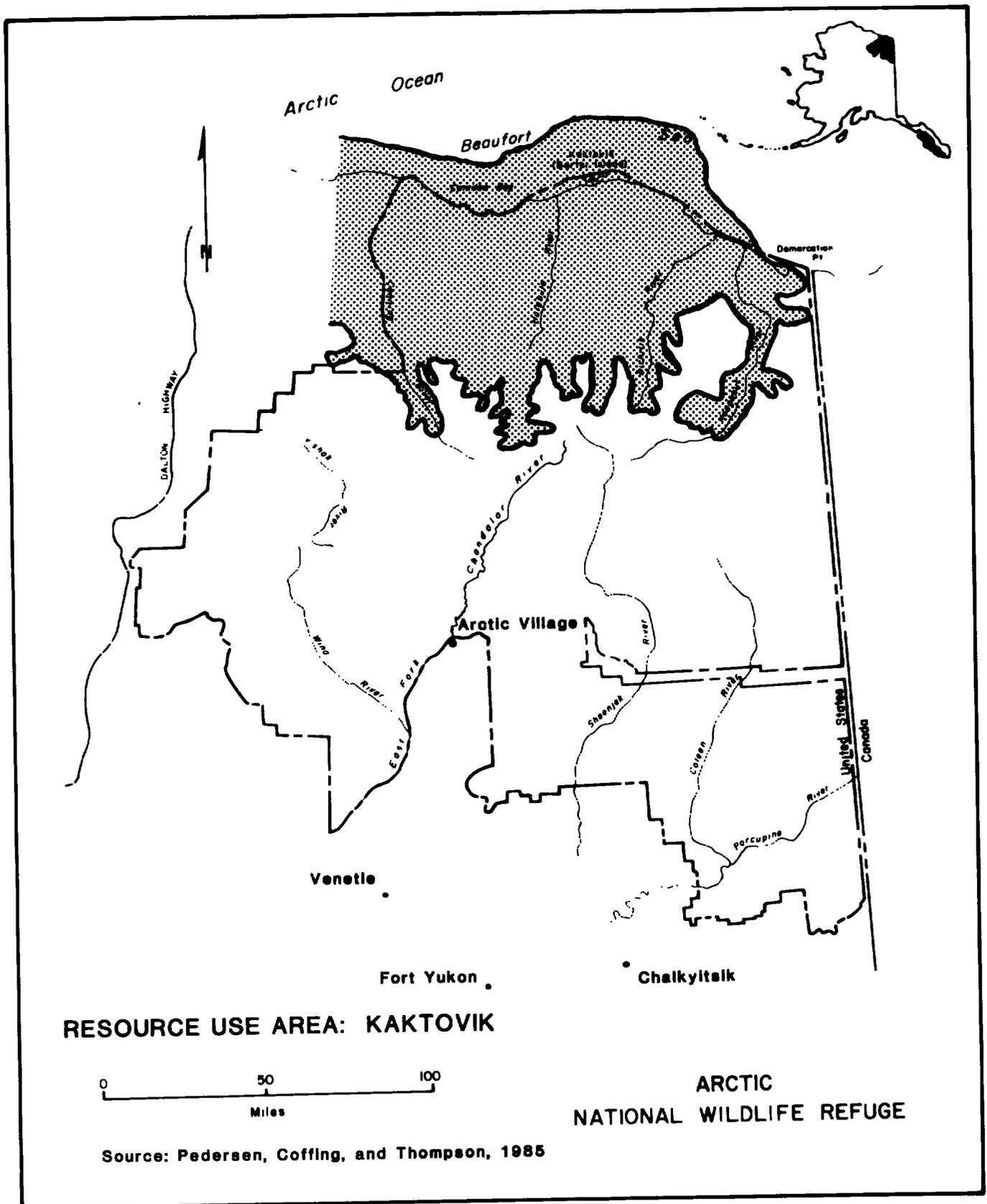
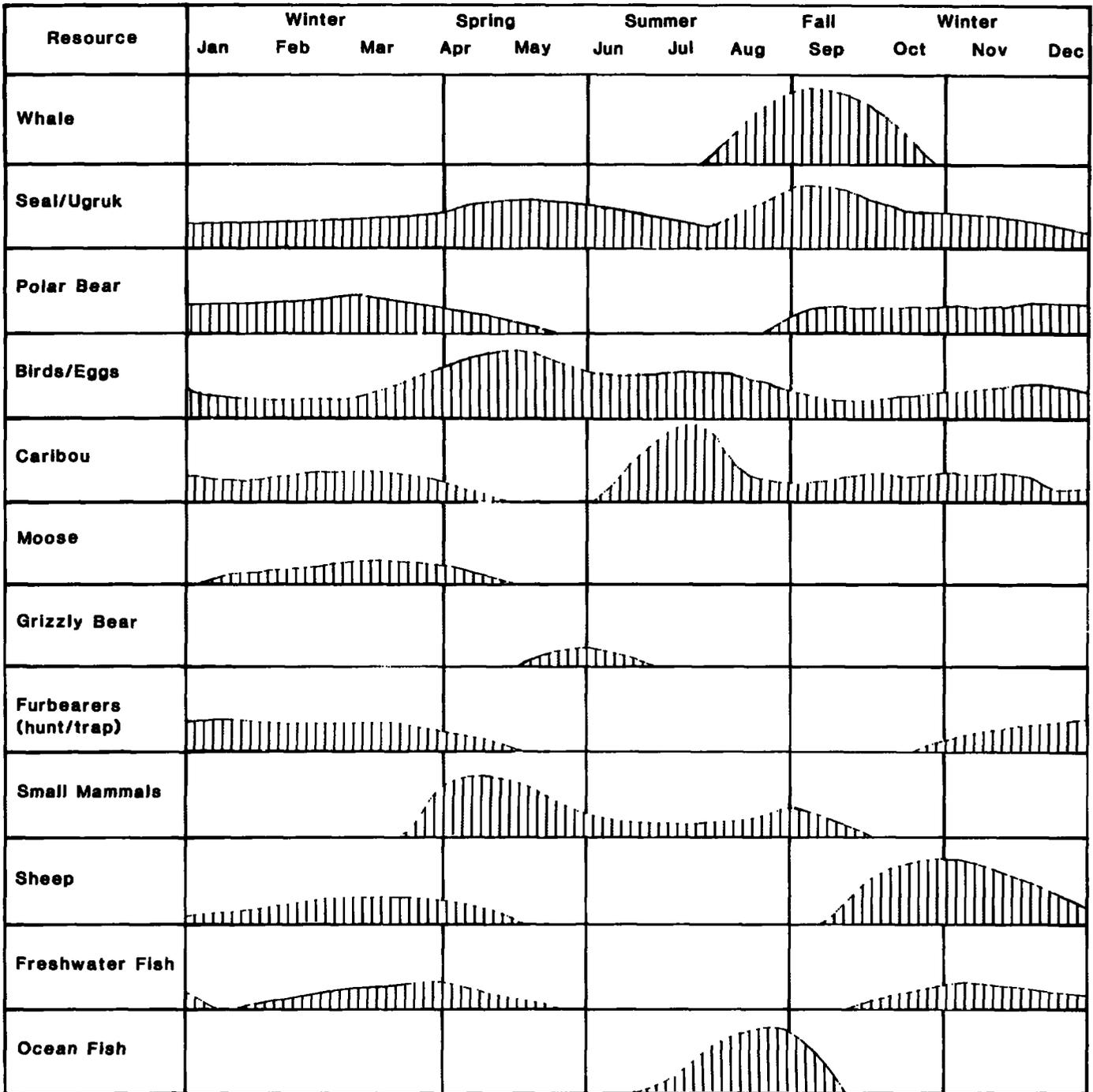


Table 7. Annual cycle of subsistence activities for Kaktovik residents.



Patterns indicate desired periods for pursuit of each species based upon the relationship of abundance, hunter access, seasonal needs, and desirability.

Source: Jacobson, M.A., and C. Wentworth, 1982

taken. Then it may take another week of work, often in cold and stormy weather, to cut up, transport, divide and deliver the whale meat, maktak and baleen to each household (Jacobson and Wentworth, 1982).

After whaling is over, people prepare for travel to the mountains. They usually wait for freeze-up and sufficient snow cover before leaving. Travel most often follows the Hulahula River south into the Brooks Range.

People go into the mountains for periods ranging from a few days to a month at a time. The average stay is one to two weeks. The principal "snow season" camps are located along the Hulahula and Sadlerochit rivers. On the Hulahula, people usually erect wall tents near Fish Holes 1, 2 and 3, which are traditional ice fishing sites. On the Sadlerochit, camping areas are less defined. Tents are heated with wood-burning stoves fueled by willow branches. Principal species sought during the fall in the mountains are caribou and Dall sheep. Trapping for red and cross fox, wolves, and wolverine also occurs during this time. Trips to the mountains peak in early November and extend into mid-December when lack of daylight reduces activity (Jacobson and Wentworth, 1982).

Trapping is one subsistence activity that continues through the darkest months. In addition to red and cross fox, arctic fox are trapped on the coastal plain, often around Barter Island.

Polar bear are also hunted during the darkest months. Bear are not usually taken until after freeze-up, a time when many of them occur along the coast. People generally hunt them only in the vicinity of Barter Island.

Hunters return from the mountains for Thanksgiving and Christmas holidays. Whale, caribou, sheep, and fish are distributed at holiday feasts. There are also dances, games, and snowmachine races.

In January and February, people start returning to the mountains. Trips increase in March and April, with the increase in daylight and slightly warmer temperatures. Winter fishing at the Hulahula River fish holes is best from late February through early April. Some caribou are also taken during this period, and an occasional moose may be shot. Sheep hunting may take place, but to a much lesser extent than in the fall. April and May are best for taking arctic ground squirrel, ptarmigan, and even a few marmots. The last trips to the mountains in spring season are often made to get squirrel and ptarmigan (Jacobson and Wentworth, 1982).

Migratory waterfowl hunting begins along the coast in late May or early June as soon as there is some open water. Sometimes the last trips to the mountains are combined with the first trips for waterfowl hunting. People commonly set up tents in the Camden Bay area along the coast, then head inland to the mountains for squirrel, hunting ptarmigan along the way. Then they return to the coastal camp and hunt eiders and brant, if the birds have arrived by that time.

In early June, waterfowl hunting usually takes place closer to Barter Island because snowmachine travel is more difficult due to reduced snow cover. Camps are set up on the mainland southeast of Barter Island, on Arey Island, or at other locations, depending on where the birds are flying. Stays at these camps range from overnight to two weeks. Seals and caribou are also taken on these trips (Jacobson and Wentworth, 1982).

Subsistence activities slacken later in June for several reasons. Snowmachine travel is restricted with the lack of snow, and the lagoons are still frozen so boat travel is impossible. Squirrels and marmot are shedding so their fur is not good. Ptarmigan have dispersed for mating, and are therefore harder to hunt.

As soon as the ice goes out in July, subsistence activities resume. Many people begin traveling along the coast by boat. The legal season for caribou begins July 1, and if any are seen along the coast people begin to hunt them. July is also the best month of the year for catching arctic char. Net fishing begins as soon as Kaktovik Lagoon is navigable. Hook and line fishing for char also occurs at Barter Island. A popular spot is near the east end of the airstrip, where fish move in and out of Kaktovik Lagoon. Char fishing continues to be good into August. About August 1 arctic cisco also appear in the nets. August and September are the best months for arctic cisco fishing (Wentworth, 1979).

Arctic Village - Figure 29 shows where Arctic Village residents generally harvest resources in or near the Arctic Refuge. Residents hunt and fish on Old John Lake, and the Chandalar, Sheenjek and Junjik rivers. The Sheenjek drainage, in particular, receives heavy use from Arctic Village residents.

Table 8 shows the annual subsistence cycle for Arctic Village and the other three south slope communities. Because of its location in the Brooks Range, Arctic Village experiences breakup later than the other three communities: breakup on the Chandalar River usually occurs in late May or early June. Waterfowl hunting begins on lakes and along the Chandalar River as the ice begins to melt. Muskrats are also hunted at this time, and gillnets are placed in rivers and lakes to obtain whitefish, pike, grayling, and suckers. Grayling are often caught in large numbers through the ice using hook-and-line. Fishing for these species continues through summer. Old John Lake is an especially important lake for harvesting lake trout in the summer (Caulfield, 1983). Patterson (1974) found fishing to account for 18% of the subsistence resources used by Arctic Village.

Caribou usually are available to Arctic Village residents by the middle of August north and east of the community on treeless ridges, and near Old John Lake. At this time of year, boats are primarily used to hunt caribou along rivers; some hunters travel by foot or use all-terrain vehicles. Gathering of firewood occurs throughout the summer. Blueberries, lowbush cranberries, and nagoonberries are also collected (Caulfield, 1983).

Figure 29. General areas where Arctic Village residents harvest resources in or near the Arctic Refuge.

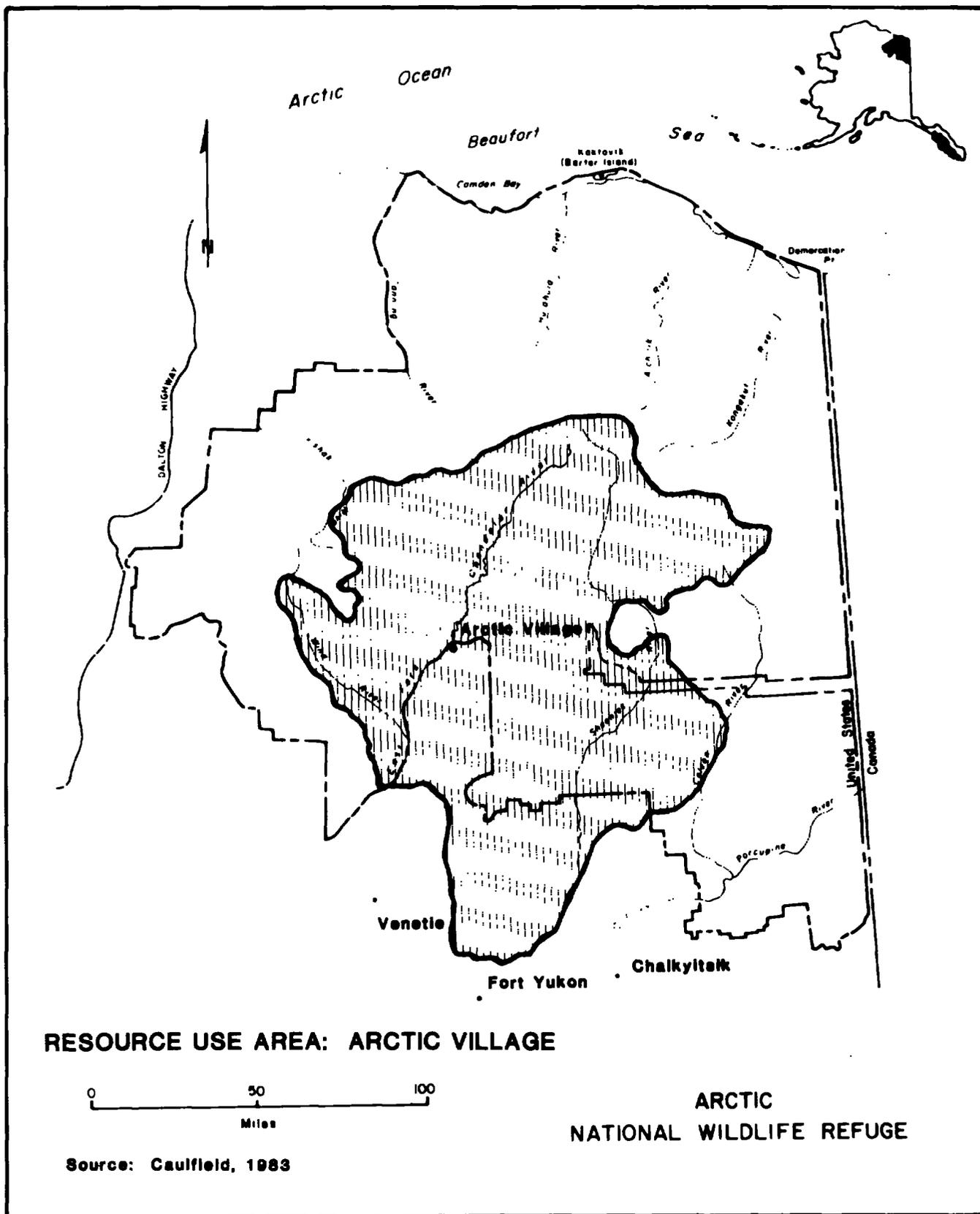


Table 8. Annual cycle of subsistence activities for Arctic Village, Chalkyitsik, Fort Yukon, and Venetie residents.

Subsistence Activity	Community	Jan Feb Mar			Apr May Jun			Jul Aug Sep			Oct Nov Dec		
Fishing	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Moose Hunting	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Bear Hunting	Chalkyitsik												
	Fort Yukon												
	Venetie												
Muskrat Trapping	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Furbearer Trapping	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Waterfowl Hunting	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Wood Cutting/Log Gathering	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Caribou Hunting	Arctic Village												
	Fort Yukon												
	Venetie												
Sheep Hunting	Arctic Village												
Hare Snaring	Arctic Village												
	Chalkyitsik												
	Fort Yukon												
	Venetie												
Ground Squirrel Trapping	Arctic Village												

Primary Activity ———

Secondary Activity - - - - -

Source: Caulfield, R.A., 1983.

Caribou, moose, ground squirrel, sheep, and waterfowl hunting are primary fall activities. Caribou and moose are harvested along the rivers until freeze-up restricts water travel, usually in late September. In recent years travel to sheep hunting areas has employed chartered aircraft. Ground squirrels are hunted and trapped, often by women and elderly persons, on alpine ridges surrounding the community. Waterfowl are occasionally harvested before ice develops on lakes and streams. In addition, "rabbit drives" are sometimes undertaken to flush out hares from willow bars along rivers where they can be harvested. Firewood gathering and berry picking continue through fall.

Snowmachine travel usually becomes possible by mid-October. Caribou hunting by snowmachine begins and continues through the winter depending upon local need and availability. Generally, caribou are no longer available to Arctic Village residents after mid- to late April.

Sheep hunting by snowmachine occurs in early winter, especially near Ottertail Creek. Sheep meat is usually saved for the elderly and for community potlaches.

In November, trappers begin to make sets for marten, fox, wolf, wolverine, and beaver. Some trappers travel long distances by snowmachine and occasionally by chartered airplane with their supplies and equipment to distant trapping areas. In recent years trappers have run lines as far away as Alexander's Village, Christian Village, and Sheenjek River. Trapping continues until about the end of March (Caulfield, 1983).

Trapping, snaring, or hunting of small game and fowl such as hares, porcupine, and ptarmigan provide variety to the local diet throughout the winter. Firewood gathering continues throughout the winter (Caulfield, 1983).

Chalkyitsik - Figure 30 shows the general areas where Chakyitsik residents harvest resources within the Arctic Refuge. Most subsistence harvests occurs outside of the Arctic Refuge boundaries.

Residents primarily use the Arctic Refuge for hunting and trapping in the fall and winter. In the fall Chalkyitsik residents occasionally harvest caribou, usually along the Porcupine River. In November trapping begins for marten, mink, lynx, beaver, wolf, and fox. Commonly used traplines extend north to the Porcupine and Coleen rivers. Trapping continues until about mid-March. Moose hunting sometimes occurs in conjunction with trapping. Caribou are occasionally harvested during spring and are valued as a source of variety in local diets.

Fort Yukon - Figure 30 shows where Fort Yukon residents harvest resources in the Arctic Refuge area. Most subsistence harvests occur outside of the Arctic Refuge boundaries. The Porcupine and Coleen drainages are the primary areas used in the refuge.

In the fall Fort Yukon residents travel up the Porcupine River or its tributaries, such as the Coleen River, to harvest moose. Black bear may also be harvested in conjunction with moose hunting. Moose are sometimes harvested during the winter, usually in November or again during February and March. Caribou hunting usually occurs in mid-September near Canyon Village or Old Rampart as animals from the Porcupine caribou herd cross the Porcupine River.

Venetie - This village's location in the Yukon Flats near the foothills of the Brooks Range provides access to resources found in the extensive lake, river, and slough systems of the Flats themselves, and resources of the upland region as well (Caulfield, 1983). Residents harvest most of their resources outside of the Arctic Refuge boundaries in the Chandalar drainage on Native corporation lands. Figure 30 shows where residents harvest resources in the refuge area. The East Fork of the Chandalar River is the primary area used by Venetie residents in the refuge. Caribou, moose, sheep, fish, furbearers and bears are taken.

Waterfowl hunting usually begins in early May and continues until early June. Once ice has left rivers and small streams, gillnets are placed in the East and North Forks to harvest whitefish, pike, and suckers. Black bear are also taken occasionally when encountered along rivers, as are caribou in late summer (Caulfield, 1983).

Moose hunting, primarily along rivers, and gillnet fishing for salmon and whitefish are major fall activities. Caribou may occasionally be harvested in fall as well.

Trapping activities begin in November. The primary species sought are marten, mink, beaver, lynx, fox, wolf, and muskrat. In the refuge most trapping occurs along the East Fork of the Chandalar River (Caulfield, 1983).

In November and early December moose are occasionally taken by hunters on snowmachines. In some years caribou are available to Venetie hunters north of the community near Gold Camp. Caribou are sought by snowmachine throughout the winter.

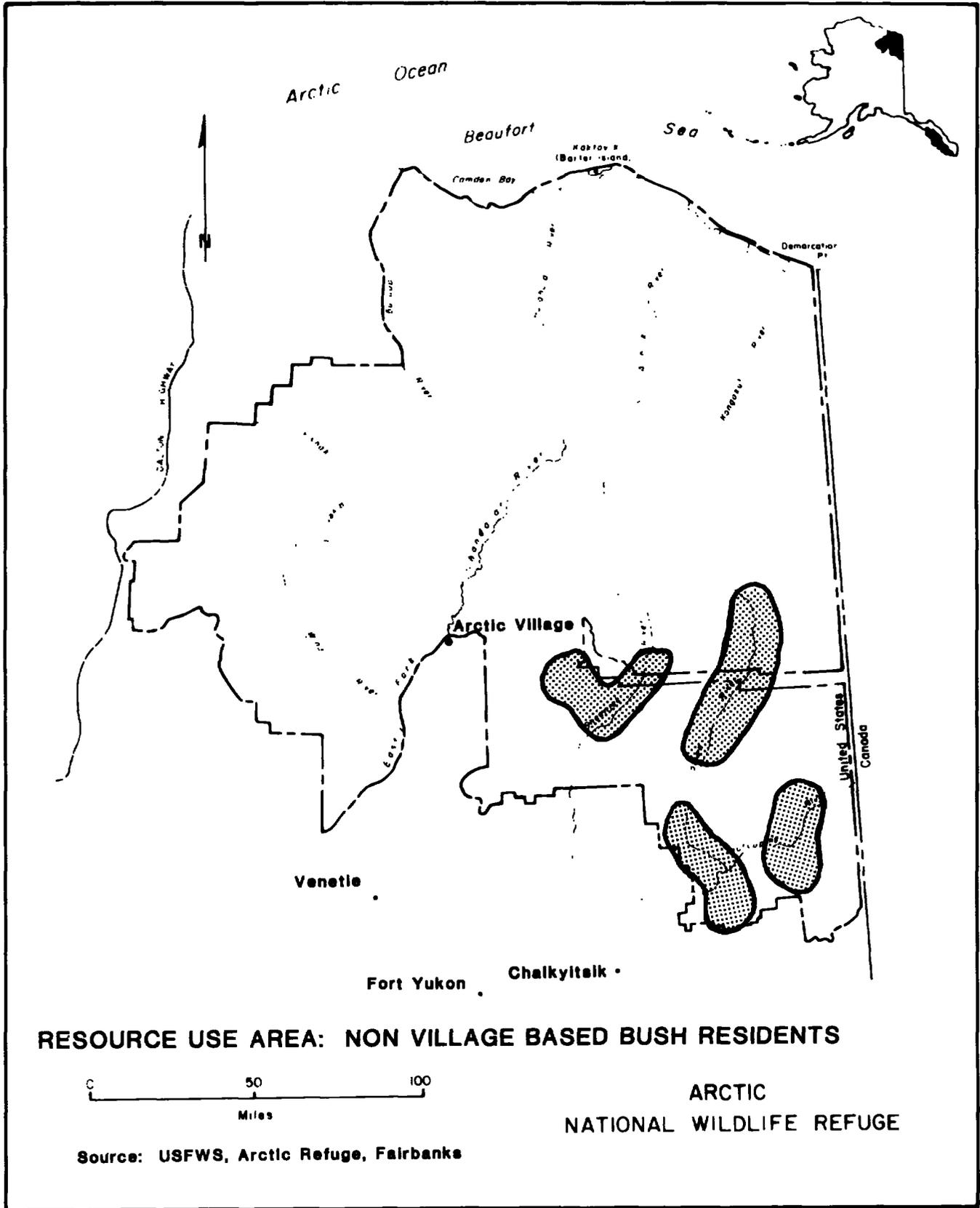
In February and March trapping turns more toward the harvest of beaver and muskrat. Moose and caribou are also taken on occasion during this time. A few people may hunt caribou with their relatives near Arctic Village at this time, especially in years when caribou are not available near Venetie.

Non-village Based Residents - Several families live throughout the year within the refuge, outside of the villages, and to a large degree subsist on harvesting refuge resources. Figure 31 shows the general areas where these families harvest resources in the refuge.

Public Uses

The four primary recreational uses of the refuge are sport hunting, river floating, backpacking, and wildlife observation. Recreationists come from around the state, the nation, and the world. Most sport hunters come to the refuge to hunt Dall sheep, caribou, moose, and brown bear. Exact numbers of consumptive and nonconsumptive users visiting the refuge are unknown. Although a large proportion of recreational visitors fish during their visits to the refuge, sport fishing is usually not a primary reason for visiting (i.e., visitors usually come for some other purpose, but often fish while there).

Figure 31. General areas where non-village based residents harvest resources.



Reliable annual public use data for the Arctic Refuge are not available. Most of the public use figures provided in this section are estimates only. Ritchie and Childers (1976) made the most comprehensive and systematic effort to date to analyze and quantify public use on the refuge. While their estimates of annual visitation are subject to qualification, they provide useful profiles of user groups and other information. In considering data from this report it should be kept in mind that the study only considered the original Arctic National Wildlife Range and not the entire refuge area as it exists today.

Ritchie and Childers (1976) estimated 1975 visitation at 281 persons for recreational use; nearly all use by this group occurred between June 1 and September 15. Backpackers accounted for the greatest amount of use (in user-days). The most heavily used areas were in the vicinity of the upper Hulahula River, Okpilak River and Peters-Schrader Lakes. Ritchie and Childers also noted a trend of generally increasing use, which is believed to be continuing.

In 1975, the Sheenjek was the most popular river for floating, carrying nine parties totaling 20 people (Ritchie and Childers, 1976). Ritchie and Childers (1976) estimated 150 hunters used the area in 1975. While hunting accounted for over half of all recreational visits, hunter visits averaged the shortest length of the user groups, usually under one week. Sheep were the major target of hunting parties. Hunting use was evenly split between north and south slope areas.

Warren (1985) estimated that 434 recreationists visited the refuge in 1977. Of these, 248 were sport hunters and 186 were non-hunters. Hunter use-days totalled 5,260, while non-hunter use-days totaled 4,990. This author noted that sport hunters tended to concentrate on a single activity--hunting. Non-hunters were more diverse in the activities they felt were most important: backpacking/hiking, viewing scenery, observing wildlife, and the wilderness experience were all identified as important. Analysis of questionnaires of over 50 individuals that only visited the additions to the refuge showed no significant difference between their socio-economic characteristics and attitudes and those characteristics and attitudes of individuals that visited the original refuge (Warren, pers. com.).

In 1984, Audi Air, Inc., the primary charter air service north of the Brooks Range, reported flying in 147 hunters, backpackers, floaters, and fishermen, compared to 109 in 1983. Approximately 20% of these were Dall sheep, caribou, moose or brown bear hunters. An undetermined number of hunters not included in the total were flown in by Audi Air from Deadhorse, and by privately-owned aircraft. These figures mostly represent recreational use on the north slope portion of the refuge.

In 1986 a more formal survey of recreational use on the refuge was undertaken (Devoe, 1986). During that year Audi Air reported flying in 176 visitors. Two other air taxi operators operating out of Fort Yukon and Fairbanks reported a combined total of 138. Based on these figures and the expected percentage of visitors that use air taxis (instead of other means) to enter the refuge, as based on the work of Warren (1980), total visitation was conservatively estimated as 515. However, some air taxi operators speculate

that more persons now are entering the refuge by means other than air taxis (i.e., private airplanes) than in the late 1970's when Warren did his study. If this is true, then the figure given above underestimates the visitation by an indeterminate amount.

Figure 32 shows generally where the most popular sport hunting areas are in the refuge, while Figure 33 shows generally the locations of the most popular hiking and rafting areas. These maps are based on refuge staff observations. Recreational use is primarily focused on the major drainages and the Brooks Range.

Sport Hunting

The Arctic Refuge is open to sport hunting, and is divided into exclusive-use guiding areas by State regulation. A guide is required for nonresidents to hunt Dall sheep or brown bear, but nonresidents can hunt other species without a guide. Alaskan residents can participate in all legal hunting without guides. Sport hunting on the refuge appears to be growing. In 1984, 13 guides were issued permits to hunt on the refuge. The guides took in a reported 97 clients. Sheep are the most commonly hunted species.

The current Dall sheep sport hunting season extends from August 10 to September 20. The Kaktovik registration sheep hunt extends from October 1 to April 30, with 50 permits available and a bag limit of 3. The heaviest recreational sheep hunting occurs on the upper Hulahula and Kongakut rivers. The Canning and Sheenjek rivers are also important sheep hunting areas. For the 1987-1988 season (through February 10, 1988) 172 sheep were taken by 252 hunters on the north side of the refuge (Alaska Dept. of Fish & Game, preliminary data).

Some caribou are harvested by sport hunters, in most cases incidentally to sheep hunting. The current bag limit is 10 caribou in those Game Management Units within the Porcupine caribou herd's range; however, under current regulations, no more than five caribou can legally be transported south of the Yukon River. The hunting season is open from July 1 to April 30. Areas where sport hunters harvest caribou include the northern reaches of the Sadlerochit, Canning and Hulahula rivers. The Sheenjek and Chandalar rivers are also hunted for caribou. For the 1987-1988 season (through 2/10/88) 17 caribou were harvested by 30 hunters on the northern side of the refuge in Game Management Unit 26C; 64 caribou were harvested by 87 hunters in Game Management Unit 25, which includes the southern portion of the refuge (Alaska Dept. of Fish & Game, preliminary data).

A few moose are harvested by sport hunters. According to estimates by the Alaska Department of Fish and Game, up to 13 animals were harvested in 1983 on the north slope of the refuge. Uncertainty exists because the estimates are made for Alaska Department of Fish & Game game management units, which do not coincide with the refuge boundaries. Estimated harvests for the refuge's north slope in 1984, 1985, and 1986 were 17, 22, and 40 animals respectively. On the south side of the refuge, harvests for 1983-1984, 1984-1985 and 1985-1986 were 30, 23 and 26 animals respectively. Harvest figures for the 1986-1987 and 1987-1988 seasons were not available.

Figure 32. Popular sport hunting areas.

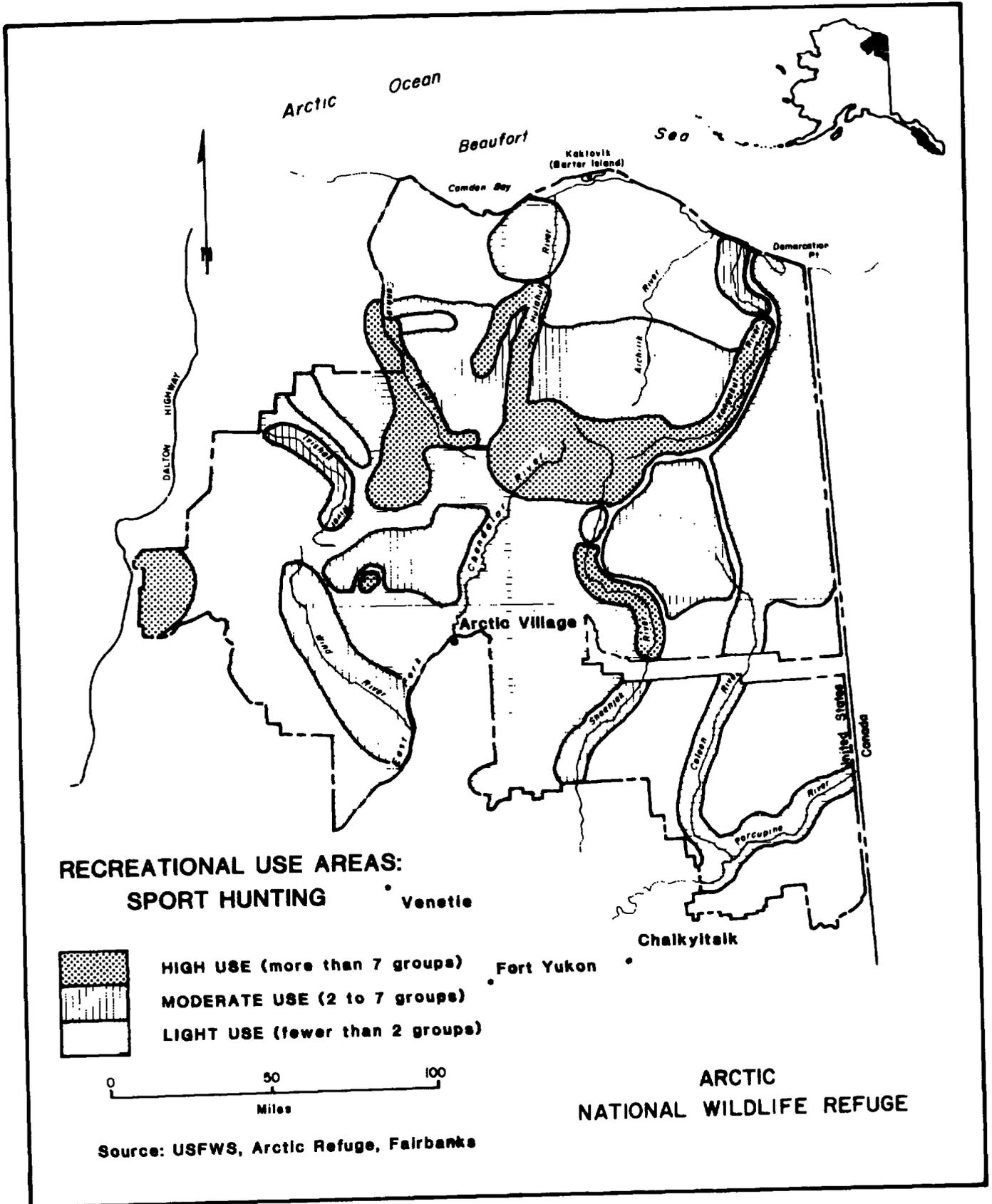
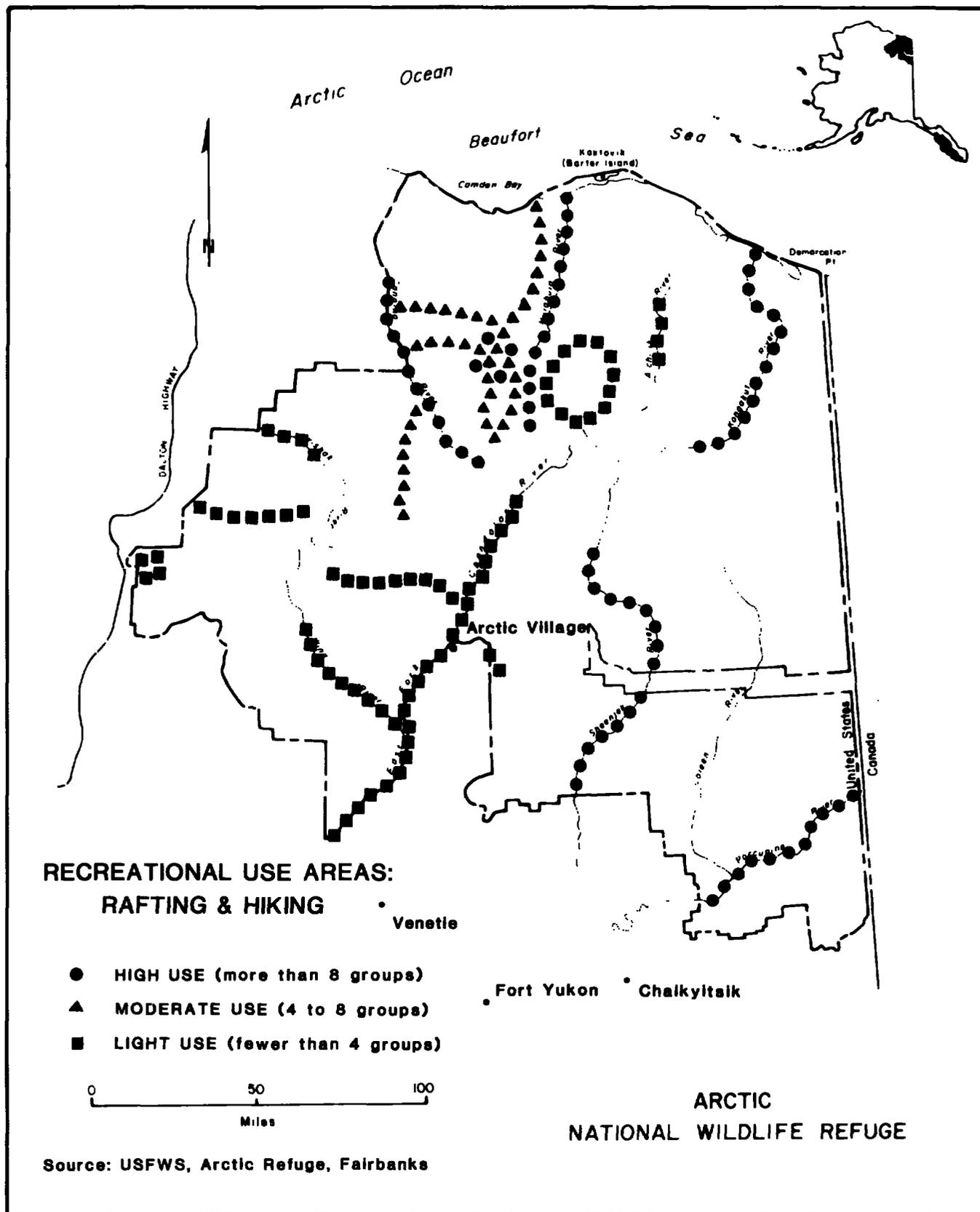


Figure 33. Popular rafting and hiking areas.



Muskox have been harvested from the refuge since 1983 in a permit hunt managed by the Alaska Department of Fish and Game. Between 1983 and 1985 the permits were issued by drawing to nonlocal sport hunters. Beginning in 1986 the permits were issued in Kaktovik, giving the local people an opportunity to harvest this resource. Harvest figures for 1983, 1984, 1985, and 1986 were 4, 5, 4, and 3 respectively.

Brown bears are primarily harvested by recreational hunters. The Alaska Department of Fish & Game estimated that 5 brown bear were harvested in 1983, 6 bear in 1984 and 6 bear in 1985 on the south side of the refuge.

Sport Fishing

Sport fishing on the Arctic Refuge has not been well documented. Fishing occurs during many visits to the refuge, but probably very few people visit the refuge specifically for the purpose of sport fishing. Fishing usually occurs in conjunction with other activities such as river trips and hunting. Arctic grayling, arctic char, lake trout, and northern pike are the most popular species taken by anglers. A licensed-angler mail survey conducted by the Alaska Department of Fish and Game estimated that in 1985 a total of 2,351 anglers fished 4,490 angler-days on the north slope, and 2,234 anglers fished 6,867 angler-days on the south slope of the Brooks Range across the state (Mills, 1986). The proportions of these totals attributable to the Arctic Refuge are unknown. The most heavily fished sport fishing rivers on the refuge are believed to be the Kongakut, Hulahula, and Canning rivers on the north slope, and the Sheenjek and Porcupine rivers on the south slope.

River Floating

Floating the rivers of the refuge appears to be one of the fastest growing forms of public use. On the north slope the Kongakut River is now estimated to be the most heavily floated river, followed by the Hulahula and the Canning rivers. The Ivishak and Sagavanirktok rivers also receive float use. On the south slope the Sheenjek and Porcupine rivers are the most popular.

Inflatable rafts are the most popular vessels for river travel, although canoes and kayaks are also used. For some of the smaller streams, especially during the latter part of the summer, kayaks and very shallow draft canoes are the only feasible alternatives.

Backpacking and Wildlife Viewing

As distinct uses, backpacking and wildlife viewing probably rank third after sport hunting and river floating. The upper Hulahula and Kongakut rivers and the area around the Peters-Schrader Lakes area are relatively popular backpacking areas. Ignek, Cache and Eagle Creek valleys are also important for hiking. The Caribou Pass area is one of the most popular wildlife viewing areas on the refuge, with the migrations of the Porcupine caribou herd being the main attraction.

Economic Uses

The primary economic uses of the Arctic Refuge include guided hunting and other guided recreational trips, oil and gas exploration, and navigational tower placement. Trapping may be considered an economic use, although it can also be classified as subsistence or recreation, depending upon the circumstances.

Guided Services

Commercial guides on the refuge offer services for hunting, river floating, backpacking, and wildlife viewing (i.e., base camp with day hiking). As noted above, in 1984 permits were issued to 13 hunting guides with a total of 97 clients. In 1985, 12 permits were issued to hunting guides, with 105 clients utilizing their services. Sheep hunts are generally the most expensive, averaging \$4,500-5,000 per client.

Ten special use permits were issued in 1984 and 9 issued in 1985 to commercial recreation guides to operate river floating, backpacking, or wildlife viewing trips on the refuge. Number of clients guided decreased from 70 in 1984 to 51 in 1985. Prices charged for these trips are highly variable, but are estimated to range between \$800 and \$2,500 per client.

Table 9 estimates annual revenues generated by guided trips into the Arctic Refuge. It is conservatively estimated that guides annually take in approximately \$332,500 for hunting trips in the refuge, and \$91,000 for other recreational trips.

Table 9. a/ Estimated annual revenues generated by guided trips in the Arctic Refuge.

	<u>Hunting Trips</u>	<u>Other Recreational Trips</u>
Guided Services ^{b/}	\$332,500	\$ 91,000
Travel From Fairbanks to Villages ^{c/}	38,000	28,000
Travel From Villages to the Refuge ^{d/}	114,000	56,000

a/ Estimates are based on the average number of clients visiting the refuge in 1984, 1985, and 1986. It is assumed an average of 95 hunting clients and

b/ 70 non-hunting clients (e.g., rafting, backpacking) would visit the refuge. This assumes each guide charges an average of \$3,500/client for hunting trips, and \$1,300/client for other recreational trips.

c/ This assumes an average cost of \$400/person on commercial flights to either Kaktovik, Fort Yukon, or Prudhoe Bay.

d/ This assumes an average cost of \$1,200/hunting client to charter a flight into the refuge, and \$800 for other recreational users.

Trapping

Trapping is a very important activity for residents of the upper Yukon region. Several refuge mammal species are trapped for their fur, including in order of importance marten, lynx, red fox, beaver, muskrat, wolf, wolverine, mink, and river otter. Residents of Arctic Village, Venetie, Chalkyitsik and Fort Yukon trap these species on the refuge during winter. A small number of other nonlocal trappers also use the southern part of the refuge as well. On the north slope, residents of Kaktovik trap red fox in inland areas and arctic foxes in coastal areas (Melchior, pers. comm.). Wolf and wolverine are also valued for their fur, but on the north slope are usually taken by hunting rather than trapping.

Historically, beaver have been the most important furbearing animal in the Yukon region. Muskrats also have been significant, exceeding the value of beaver in some years. The key to profits has often been the abundance of beaver and muskrat (the size of the harvest), not necessarily the per unit price of the pelts. Marten today is probably the most important fur species in the refuge.

Fur trapping provides the only significant export item for the south slope communities, although revenues can vary greatly from year to year depending on harvest levels and fur prices. Over the years, local residents have returned to trapping after short periods of wage-labor provided by road construction, firefighting, military service, and other limited wage opportunities. Despite variations in prices paid for furs, opportunities for trapping have been consistently available. Today trapping remains a highly labor-intensive activity, demanding long hours and hard work for relatively small and often uncertain returns for the investment costs.

Trapping activities are cyclic in nature, often responding to the rise or fall of fur prices. Trapping has generally been on the decline since World War II due to competition from synthetics and ranch furs. Nevertheless, trapping remains today a part-time occupation for many people participating in the traditional subsistence lifestyle.

Trapping is allowed on the Arctic Refuge without a permit. Besides the trapping that occurs near the villages, at least eight trappers make a substantial part of their living on the refuge (USDI-FWS, 1985). While trapping does not involve a large number of people, as an activity it has large spatial requirements.

The wolf and wolverine are the only species for which there is current information on refuge harvest levels. On the refuge's north slope, the Alaska Department of Fish & Game estimated 11 wolves were harvested in 1983-1984, 5 wolves in 1984-1985, and one wolf in 1985-1986. On the south side of the refuge the harvest figures for the same years were 6, 5 and 10.

Wolverines are highly valued for their fur, especially for making parka ruffs. They are very vulnerable to aerial and snowmachine hunting in winter because they and their tracks are conspicuous. The animals also run relatively slowly. Kaktovik residents harvest wolverines most often in the foothills and northern mountainous areas of the Sadlerochit, Hulahula, and Okpilak rivers. The Alaska Department of Fish and Game's records indicate

that an average of about one wolverine per year is harvested; this may be an underestimate because of incomplete reporting (Clough, Patton and Christiansen, 1987). During the winter of 1980-1981, seven wolverines were taken by Kaktovik residents (Jacobson and Wentworth, 1982).

Mining

There are nine active mining claims in the southern part of the refuge, seven of which were filed by the same two individuals. Two placer claims are near the Christian River and seven active claims are near the Wind River. Twenty-seven other mining claims, in the Wind River drainage, have been abandoned or are void. There is no known mining activity at any of these claims.

Oil and Gas Activities

As noted previously in this chapter, there has been considerable interest in the oil and gas potential of the Arctic Refuge coastal plain for a long time. The earliest geological studies (prior to the Prudhoe Bay discovery in 1969) were conducted by the federal and state governments. Since discovery of the Prudhoe Bay oilfield, exploration efforts, mostly studies of the surface geology, by the oil industry have increased. The earliest special use permit for oil-related studies on the refuge was one issued to the Atlantic Richfield Company in 1961. Permits have been issued every year since that time for some form of oil and gas exploration on the refuge. However, detailed oil and gas studies did not begin until the early 1980s.

Under the provisions of Section 1002 of the Alaska Lands Act, the Service allowed surface geological and geophysical studies in a portion of the coastal plain (the "1002" area) for a limited time. On July 1, 1983, oil companies began concentrated surface geological studies in the coastal plain (the "1002" area). Through the summer of 1985 crews from 13 different companies collected surface geologic information. One exploration company was authorized to collect gravity readings along a 1 x 2 mile (2 x 3 km) grid covering the entire "1002" area in the fall of 1983. Another exploration company, under contract to 23 oil companies, conducted seismic studies on the "1002" area during the winters of 1983-1984 and 1984-1985. A total of 1,333 miles (2,140 km) of seismic data were collected.^{a/}

With the drop in world oil prices that began in 1985, the number of oil and gas studies on the refuge in 1986 was severely reduced from that of previous years. Only one surface geological study was conducted on the refuge.

In 1983, the Arctic Slope Regional Corporation (ASRC) obtained title to the subsurface estate under the lands held by the Kaktovik Inupiat Corporation (KIC) within the refuge boundary. The Arctic Slope Regional Corporation authorized Chevron USA Inc. to conduct seismic studies on these lands, which occurred during the winters of 1983-1984 and 1985-1986. The Service has also allowed seismic exploration to occur in conjunction with these activities on the coastal lagoon areas that are still federally-owned north of the Native corporation lands.

^{a/}The results of the studies in the "1002" area are summarized in Clough, Patton and Christiansen (1987).

In the winter of 1984-1985 the Arctic Slope Regional Corporation authorized Chevron USA Inc. to begin drilling an exploratory well on the Native corporation lands near Oruktalik Lagoon. An ice road and ice air strip were built to service the well. The well was drilled over two winters, and was completed in April 1986. Results of the drilling effort are considered proprietary information and have not been made available to the federal government. Rehabilitation of the well site is in progress.

Navigation Towers

Special use permits are issued to private companies for establishing temporary navigation beacon towers on the refuge. The towers are used to precisely position crews conducting seismic exploration in the Beaufort Sea. The towers, which are 50 to 60 feet (15 to 18 m) tall, are mostly installed on the coastal plain, the majority near the coast. They are usually erected in the middle of June and taken down at the end of September. Occasionally towers are erected during the winter for seismic surveys on the sea ice. Towers are installed, serviced and periodically moved by helicopter. Fifty-nine tower sites were authorized in permits to 6 different companies by the Service in 1985. However, towers are usually not erected at all permitted sites.

WILDERNESS REVIEW

About 41% of the Arctic Refuge (8 million acres or 3.2 million ha), comprising most of the original wildlife range, was designated as wilderness by the Alaska Lands Act. Section 1317 of the Alaska Lands Act directs the Service to study all of the non-wilderness lands in Alaska refuges and recommend areas suitable for inclusion in the National Wilderness Preservation System. This section describes the process used in studying 9.5 million acres (3.8 million ha) of federal lands within the Arctic Refuge, excluding the "1002" area, and evaluates the wilderness qualities on those lands.

As explained in the NOTICE TO THE READER, the "1002" area is not included in the wilderness review analysis.^{a/} Management of this area as wilderness can not be considered until Congress acts and selects one of the five management alternatives analyzed in the 1002(h) report and the accompanying legislative environmental impact statement. In the event Congress selects Alternative D, the "no action" alternative in the 1002(h) report, the area will be examined for wilderness suitability and the necessary environmental documentation will be prepared. Under the other alternatives, future consideration of the "1002" area as wilderness is not a factor.

Criteria for Wilderness Review and Evaluation

Most of the criteria for evaluating the wilderness qualities of refuge lands are based on the Wilderness Act of 1964, which defines wilderness as follows:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The Service used seven criteria in evaluating the wilderness qualities of the refuge lands: land ownership; natural integrity of the area; apparent naturalness; opportunities for solitude; primitive recreation opportunities; size; and the presence of special or unique features. This evaluation will determine what lands are suitable for wilderness designation, based solely on the seven criteria, without regard for possible uses on or management of these lands.

^{a/} An analysis of the wilderness suitability of the "1002" area can be found on pages 478-483 in the Arctic National Wildlife Refuge coastal plain resource assessment. Final report. Baseline study of the fish, wildlife, and their habitats. Vol. II (Garner and Reynolds, 1986).

Size of Area

The Wilderness Act requires that a wilderness be 5,000 acres (2,000 ha), or be large enough to allow for its preservation and use in an unimpaired condition.

Land Ownership

Only areas where the federal government owns both surface and subsurface rights are suitable for wilderness designation. Specifically, conveyed lands are no longer under federal ownership and thus are unavailable for wilderness designation. Lands with encumbrances in the refuge, such as valid mining claims, are unsuitable for wilderness designation because of the potential development(s) that can occur. Selected lands may or may not be suitable for designation depending on the final determination of land status. About 99% of the non-wilderness land within the refuge boundary is presently owned by the federal government, and thus is eligible for wilderness designation. (Current land status is discussed at the beginning of this chapter.)

Natural Integrity

This criterion refers to the degree to which an area retains its primeval character and influence from an ecological perspective.

Apparent Naturalness

Apparent naturalness refers to the degree to which a landscape appears unchanged by human activity.

Opportunities for Solitude

Solitude refers to the degree of isolation from the sights, sounds and presence of others and from the developments and evidence of man. According to the Wilderness Act, a wilderness area must provide either "outstanding" opportunities for solitude, or "outstanding" opportunities for primitive recreation.

Outstanding Opportunities for Primitive Recreation

To experience primitive recreation, visitors should perceive a vastness of scale, feel they are part of the natural environment, and experience a high degree of isolation, challenge, and risk. Primitive recreation requires outdoor skills and meeting nature on its own terms without comfort and convenience facilities.

Special and Unique Features

This criterion refers to special ecological features (e.g., threatened or endangered species, wilderness-dependent species, unusual plant or animal communities), landforms that represent significant examples of geologic processes (e.g., natural bridges, caves, lava flows, glaciers), scenic values and cultural features. Special features are optional in wilderness areas. The Wilderness Act states that wilderness areas "may" have these features.

Evaluation of Wilderness Review Units

To analyze the wilderness suitability of the non-wilderness lands in the Arctic Refuge, the refuge was divided into two major wilderness review units: the Brooks Range, and Porcupine Plateau. These units correspond to physiographic regions. Figure 34 shows the location of the two areas. The eastern half of the Brooks Range region and a small portion of the coastal plain region are already included within the present Arctic Refuge Wilderness.

Brooks Range

This is a large area of rugged relief that straddles the continental divide on the western side of the refuge, extending from near the Dalton Highway to the boundary of the existing Arctic Wilderness, just past the East Fork of the Chandalar River. Mountain peaks and elongated ridges reach up to altitudes between 6,000 and 7,500 feet (1,800 to 2,300 m). Small glaciers are found along the divide and many empty cirques are evidence of recent abandonment by glacier ice. The area contains the headwaters of many of the rivers occurring on the refuge, including the Ivishak and Wind national wild rivers. The river valleys are deeply scoured glacial troughs with flanking walls as high as 3,000 feet (915 m).

The river valleys and mountain lakes in this unit have high wildlife values. Moose and Dall sheep are abundant. Wilderness-dependent species found here include brown bear, wolf and wolverine. The East Fork of the Chandalar River is suspected to be important for chum salmon spawning and rearing. Chinook salmon also are present in this stream system.

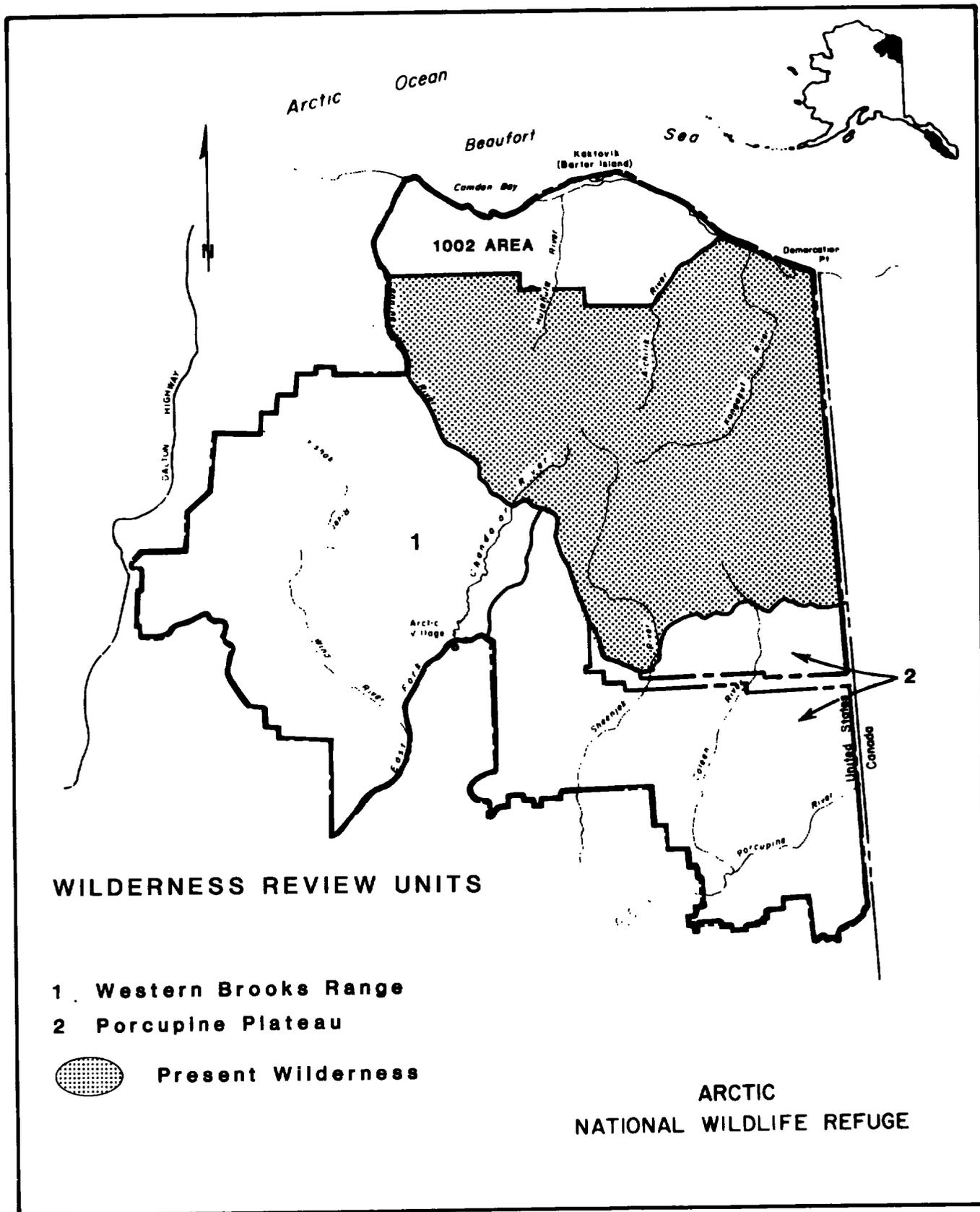
1. Size - The Brooks Range wilderness review unit meets the size criterion. The unit covers about 5.5 million acres (2,2 million ha), or 28% of the refuge.

2. Land ownership - Except for a few private inholdings (primarily Native allotments) along the Wind, Junjik, Ribdon, and East Fork of the Chandalar rivers, and two townships of Native lands near the mouth of the Wind River, this unit is entirely in federal ownership. No developments are anticipated on the inholdings that would affect the wilderness qualities of this unit.

There are five unpatented mining claims within the unit near the Wind River. Should these claims be developed, the wilderness qualities of the immediate area would be lost. Should access to the claims require road access, wilderness values along this route would be lost.

3. Natural integrity - The fish and wildlife populations and ecological systems in the Brooks Range unit are largely unaffected by human activities. Very little human use occurs in most of this unit because of its remoteness and lack of access. Hunting, fishing, trapping, and nonconsumptive recreational activities are the primary uses of the area, none of which have significantly affected the natural integrity of the unit.

Figure 34. Wilderness review units.



4. Apparent naturalness - Except for some cabins on allotments, and a Service cabin in the Phillip Smith Mountains, there are no structures or human habitations in the unit. There are four active mining claims near the Wind River, including two mill sites, but the assessment work that has taken place has not significantly affected the apparent naturalness of the area.

5. Outstanding opportunities for solitude - The Brooks Range unit offers outstanding opportunities for solitude. The unit is large, extremely rugged, and remote, with little access--other than near the Dalton Highway on the west boundary and Arctic Village on the south boundary, the chances of encountering other people is unlikely. It is possible to travel for many days without experiencing any significant evidence of people, other than the brief sighting of aircraft.

6. Outstanding opportunities for primitive recreation - The area's spectacular mountain scenery and low volume of use provide outstanding opportunities for primitive recreation. There are many opportunities for hiking, wildlife viewing, and hunting. With no recreational services or developments, including public use cabins, established trails, bridges, or river crossings, visitors in the Brooks Range unit would need to be self-reliant, dependent on their outdoor skills. Challenge, isolation, and risk would be part of any recreational experience in this unit.

7. Special or unique features - The Brooks Range itself is a special refuge feature, with its dramatic alpine scenery. Other special features that have been identified in the Brooks Range include Atigun Gorge, Porcupine Lake, and Ribdon-Accomplishment Low Pass. Atigun Canyon is a deep, scenic gorge that supports many wildlife populations. Porcupine Lake, one of the few large, high-elevation lakes in the eastern Brooks Range, also supports abundant wildlife populations. The Ribdon-Accomplishment Low Pass, in an exceptionally rugged glaciated portion of the Phillip Smith Mountains, has been identified as one of the state's outstanding scenic complexes. Both Atigun Canyon and Porcupine Lake have been recommended as a national natural landmarks.

Conclusion - Federal lands in the Brooks Range Unit meet all of the Wilderness Act criteria, including size, ownership, natural integrity, apparent naturalness, and outstanding opportunities for solitude and primitive recreation. It also has several special features.

The Porcupine Plateau

This unit is located south of the Brooks Range, stretching eastward from the East Fork of the Chandalar River to the Canadian border. It is an area of scattered mountains and hills with broad tree-covered valleys. Numerous major tributaries of the Porcupine River drain the area. The Porcupine River is an important migratory path for fall chum and coho salmon going into Canada to spawn. The upper Sheenjek River, a designated national wild river, runs through this unit. The Sheenjek River possessed a 1987 fall chum spawning escapement of 150,000, with a historic range of from 27,130 to 152,768 fish (Joint Canada/U.S. Yukon River Tech. Comm., 1987; ADF&G, 1987). Chinook salmon also are present, but have not been enumerated in sonar counts.

The Porcupine Plateau Unit provides important Porcupine caribou herd winter habitat and is a key spring and fall migratory route for these animals. Numerous caribou trails crossing the Porcupine River are imprinted deeply into the tundra, providing a unique and often-cited example of wildlife as a geologic force. The area supports wilderness-dependent wildlife, including brown bear, wolf, and wolverine, as well as moose and furbearers. Of particular significance is the presence of prime habitat for the endangered American peregrine falcon. The Porcupine River in this unit is identified as one of the best nesting areas for this rare bird in all of Alaska.

1. Size - The Porcupine Plateau Unit meets this criterion. The unit encompasses approximately 4.1 million acres (1.7 million ha), or 22% of the refuge.

2. Land ownership - Most of the lands in this unit are under federal ownership. The area near Arctic Village and Old John Lake has over twenty small private inholdings, primarily Native allotments, and many applications pending for allotments. Development of these inholdings could affect the wilderness qualities of federal lands near the Old John Lake area. Several small private inholdings also exist along the Porcupine River. The Doyon Regional Native Corporation has selected lands in several areas in the unit, including parts of two townships on the Porcupine River, a township near the western boundary of the unit, and a township near the northern boundary of the unit; part of one township on the southern boundary of the unit has been conveyed to the Native corporation. No developments are anticipated on the inholdings that would affect the overall wilderness qualities of this unit.

There are two unpatented mining claims within the unit near the Christian River (Township 31 North, Range 12 East, sections 23 and 27). Should these claims be developed, the wilderness qualities of the immediate area would be lost. Should access to the claims require road access, wilderness values along this route would be lost.

3. Natural integrity - The Porcupine Plateau's fish and wildlife populations and ecological systems are largely unaffected by human activities. Subsistence hunting, fishing, and trapping are the primary uses of the area, none of which have significantly affected the natural integrity of the unit.

4. Apparent naturalness - The Porcupine Plateau Unit has only a few visible signs of people. There are exploration trails and cabins on allotments in the unit. A trail goes from Arctic Village a few miles to Old John Lake. A cat trail was put through from Fort Yukon to the Canadian border in the late 1950s. Neither of these trails can be seen from very far away, and do not affect perceived naturalness of the unit. There are also a few cabins on allotments in the unit, and trapper cabins under permit. Other than these sites, there are no structures or human habitations in the unit.

5. Outstanding opportunities for solitude - The Porcupine Plateau offers outstanding opportunities for solitude because it is large, remote, infrequently visited, and well screened by forest cover. The only place where other people are likely to be encountered is in the Old John Lake area. People also may be encountered occasionally on the Sheenjok River and the Porcupine River. For most of the unit it is possible to travel for many days

without experiencing any significant evidence of people, other than the brief sighting of aircraft.

6. Outstanding opportunities for primitive recreation - This unit is one of the most remote and least visited parts of the United States. The Porcupine and Sheenjek rivers offer outstanding opportunities for primitive recreation. These rivers offer good float trip opportunities, as well as opportunities to hunt, fish, view wildlife, and hike in a primitive setting. The ramparts of the Porcupine River, in particular, are highly scenic. In all of the unit visitors would need to be self-reliant, dependent on their outdoor skills.

7. Special or unique features - The unit has four identified special features. Old John Lake, at the headwaters of the Koness River, is significant for its lowland spruce and sedge meadow vegetation and abundance of wildlife. The upper Coleen River supports the northernmost stands of white spruce found on a southern drainage in the Brooks Range, and abundant wildlife as well. The Koness River caribou range and watershed includes a large portion of the winter range of the Porcupine caribou herd on the south slope of the Brooks Range. Finally, the ramparts of the Porcupine River are of both geologic and scenic interest. It also provides breeding habitat for the endangered peregrine falcon subspecies, as well as golden eagles. Old John Lake, the upper Coleen River, and the ramparts of the Porcupine River were all recommended as national natural landmarks; the Porcupine River ramparts were also recognized as one of the state's outstanding scenic complexes.

Conclusion - The Porcupine Plateau Unit meets the wilderness criteria of land status, land ownership (with the possible exception of the Old John Lake area), natural integrity, apparent naturalness, and outstanding opportunities for solitude and primitive recreation. It also has several special features.

V. MANAGEMENT ALTERNATIVES

V. THE MANAGEMENT ALTERNATIVES

This chapter consists of three parts: a description of the management categories that make up each alternative; a description of the management directions common to all of the alternatives; and a description of the alternatives themselves. This chapter also identifies the areas that would be suitable to recommend for wilderness designation under each of the management alternatives. All of these sections form the core of the Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement.

MANAGEMENT CATEGORIES

According to the Alaska Lands Act the comprehensive plan for the Arctic Refuge must: (1) designate areas within the refuge according to their respective resources and values, (2) specify management programs to conserve fish and wildlife resources in each area, and (3) specify uses within each area that may be compatible with refuge purposes. Comprehensive planning must also comply with the National Environmental Policy Act (NEPA), which requires that reasonable alternatives be considered.

To develop management alternatives that meet the requirements of the Alaska Lands Act, five management categories were identified for the Arctic Refuge. Each management category provides overall direction for managing a given area in light of its resources and existing and potential uses. Table 10 summarizes what management activities, public uses and economic uses would be permitted in each management category and under what conditions. All references to access on the refuge are subject to the provisions of Sections 811 and 1110(a) of the Alaska Lands Act (see the "Public Access" common management direction).

The five management categories used in developing management alternatives for the Arctic Refuge are as follows:

Intensive Management (I)

This category is designed to accommodate compatible economic development and a wide variety of resource management techniques while protecting key refuge resource values. Resource management activities will focus on ensuring that fish and wildlife populations and their habitats are afforded adequate short-term and long-term protection. Natural processes may be modified and the influence of human activities may be evident in intensive management areas. Permitted management practices allowed under this category may include highly manipulative techniques, such as mechanical manipulation of vegetation, construction of artificial impoundments and dikes, and the construction of permanent fish weirs and hatcheries. Public use facilities, administrative sites, transmission lines, pipelines, and transportation systems may be permitted. Oil and gas studies may be permitted subject to site-specific compatibility determinations. Sand and gravel removal also may be permitted, subject to site-specific stipulations to minimize impacts to fish and wildlife, under this category. Increased public use may be encouraged in intensive management areas, except in areas where potential conflicts with economic uses may occur.

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories.

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>HABITAT/POPULATION MANAGEMENT ACTIVITIES</u>					
<u>Research and Management Studies</u> Collection of data necessary for refuge management decisions or to further science. Priority will be given to studies that contribute to the use and management of native fish and wildlife populations and their habitats. Studies may be conducted by the Service, the Alaska Department of Fish and Game, or by other researchers under Service guidance.	Will be routinely practiced so long as the studies do not conflict with refuge purposes	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Ecological Monitoring</u> Activities or studies that examine how fish and wildlife and their habitats are changing due to either natural or human causes.	Will be routinely practiced	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Fish and Wildlife Inventories</u> Using management techniques to obtain information on species distributions, habitats, and population dynamics to meet refuge objectives.	Will be routinely practiced	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Marking and Banding</u> To contribute information on population trends, survival, and movements necessary for the overall management of the species. Cooperation with the Alaska Department of Fish and Game and other institutions will be stressed.	Will be routinely practiced as long as the activities do not conflict with refuge purposes	Same as (I)	Same as (I)	Same as (I)	Same as (I)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

HABITAT/POPULATION MANAGEMENT ACTIVITIES	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>Wildlife Stocking</u> Re-establishing, augmenting, or maintaining native species within their original breeding range. Specific policies apply for various wildlife groups.	May be permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Pest Control</u> Relocation or removal of pests that threaten human health and property or survival of native fish and wildlife species.	Normally will not occur except to control exotic species; native species may be controlled where severe resource danger is likely or where public health or safety is jeopardized	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Predator Control</u> Relocation or removal of predators to favor other wildlife populations or to protect reintroduced, threatened or endangered species.	May be permitted where biologically justified, subject to the provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Disease Prevention and Control</u> Management practices directed at controlling pathogens that threaten fish, wildlife, and people. Includes rabies control and parasite control.	Normally will not occur except where severe resource damage is likely or where public health or safety is jeopardized	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Fire Management</u> Actions taken to suppress wild fires, in accordance with the interagency fire management plan.	Natural fires may be permitted to burn when the fire danger is low, except where they threaten human life and property or reach excessive size; prescribed burning will be used for hazardous fuel reduction or restoration of natural vegetation patterns	Same as (I)	Same as (I)	Same as (I)	Same as (I)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

HABITAT/POPULATION MANAGEMENT ACTIVITIES	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>Habitat Improvements</u> o Mechanical manipulation, such as large scale tree crushing, and water diversions, impoundments, etc.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	May be considered subject to appropriate plan revision ^{a/}	Not permitted	Not permitted
o Prescribed burning	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act, a compatibility determination and an approved fire management plan	Same as (I)	Same as (I)	Same as (I)	Same as (I)
o Minor habitat improvements including nesting devices, temporary actions to protect habitat, beaver dam removal, etc.	May be permitted subject to provisions of the National Environmental Policy Act a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I), subject to the minimal tool concept
<u>Timber Management</u> Way of maintaining a sustained yield for long-range subsistence needs, for house logs and firewood. May entail designation of areas for cutting and the issue of special use permits.	May be permitted, subject to reasonable regulations	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Exotic Wildlife Species Introduction</u> Introduction of species not native to North America.	Not permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Native Wildlife Species Introduction</u> Introduction of species native to North America outside their original range.	May be permitted where biologically justified and implemented in accordance with the National Environmental Policy Act, and a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I)

^{a/}For further information clarifying this management direction see Appendix P.

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>HABITAT/POPULATION MANAGEMENT ACTIVITIES</u>					
<u>Water Quality and Quantity</u> Monitoring of water quality and quantity to enable the Service to propose mitigation of adverse effects that originate on or off the refuge.	Will be routinely practiced	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Administrative Facilities</u> Structures built for administrative use, primarily to facilitate field work logistics; available for emergency use by the public.	Permitted	Same as (I)	Same as (I)	May be built if needed for the protection of public health and safety	Same as (IV)
<u>FISHERIES DEVELOPMENT</u>					
Collection of data and information on fish populations and their habitats, modification of fish habitat, fish hatchery programs and related activities, fishery regulation, supplemental production, and other activities designed to meet management goals and objectives. Fisheries developments may be permanent or temporary. A temporary fishery development is any structure or man-made improvement that can be readily and completely dismantled and removed from the site when the period of authorized use terminates.					
<u>Fish Passes</u> The construction or installation of a fish ladder, or removal of a barrier (e.g., beaver dams), or other activity to enable fish to get past a natural or man-made barrier and reach inaccessible habitat; the fish pass may be either temporary or permanent.	May be permitted on a case-by-case basis subject to the provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted	Same as (IV)
<u>Fish Weirs</u> The construction and installation of an in-stream fish counting facility. Weirs may be either permanent or temporary. Permanent weirs have a permanent in-stream anchoring device, while temporary weirs do not. The above-water structure for both types of weirs would be removed after the season of use.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will not normally be permitted	Same as (IV)
<u>Spawning Channels</u> The construction and maintenance of an artificial gravel laden channel where water quality and quantity is controlled to facilitate spawning by fish.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted	Same as (IV)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

HABITAT/POPULATION MANAGEMENT ACTIVITIES	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>Physical Habitat Modifications</u> Activities designed to physically modify aquatic habitats for the purpose of affecting production of a target fish species, such as bank stabilization or installation of in-stream structures. The change may be either permanent or temporary.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted	Same as (IV)
<u>Chemical Habitat Modifications</u> Introduction of either organic or inorganic chemicals on an annual or temporary basis to an aquatic environment to control production of a target fish species.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted	Same as (IV)
<u>Native Fish Reintroductions</u> Reintroduction of native species for the purposes of re-establishing historic populations.	May be permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Native Fish Introductions</u> Introduction of fish species native to North America outside of their original range.	May be permitted on a case-by-case basis	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Exotic Fish Introduction</u> Introduction of species not native to North America.	Not permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Fish Rearing Ponds</u> Use of natural ponds for rearing fry or fingerling fish to a larger size.	May be permitted on a case-by-case basis subject to the provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Fish Hatcheries</u> The construction and operation of required facilities for incubation of fish eggs and/or rearing of fish fry, fingerlings, or smolts. A hatchery can be either permanent or temporary. A permanent fish hatchery could be operated either seasonally or year-round and would be permanently maintained. A temporary fish hatchery would be operated seasonally and is project related (removed when project is completed).	May be permitted on a case-by-case basis subject to the provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted	Same as (IV)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>HABITAT/POPULATION MANAGEMENT ACTIVITIES</u>					
<u>Supplemental Fish Production</u> Planting fertilized or eyed eggs, fed or unfed fry, fingerlings, presmolts, or smolts which have been incubated, hatched, fed and/or reared at a hatchery or temporary rearing facility and are subsequently introduced into the species' natural environment.	May be permitted on a case-by-case basis subject to the provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Fish Egg Taking Site</u> The installation and operation of a temporary facility that uses adult spawning fish to take eggs for the establishment of a brood stock or for use in supplemental production; both the facilities and activity would be on an "as needed" basis.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Predator/Competitor Control</u> Removing or reducing predators and/or competitor fish species for the purpose of controlling the production of a target fish species.	May be permitted on a case-by-case basis subject to provisions of the National Environmental Policy Act and a compatibility determination	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>SUBSISTENCE ACTIVITIES</u>					
<u>Fishing, Hunting, Trapping, Berry Picking</u> The taking of fish and wildlife and other natural resources for personal consumption or as provided by law. Allows use of traditionally used camping areas.	Permitted subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>House Log and Firewood Collection</u> Collection for personal or extended family use.	Permitted subject to reasonable regulations	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Cabins</u> Small, primitive structures necessary for health and safety and necessary to provide for continuation of ongoing traditional activity; not for recreational use.	May be permitted subject to special use permit	Same as (I)	Same as (I)	Same as (I)	Same as (I)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
SUBSISTENCE ACTIVITIES					
Access Use of snowmobiles, motorboats, and other means of surface transportation traditionally employed for subsistence purposes.	Permitted, subject to reasonable regulation and the provisions of Section 811 of the Alaska Lands Act	Same as (I)	Same as (I)	Same as (I)	Same as (I)
PUBLIC ACCESS METHODS (Restrictions subject to Sections 811 and 1110(a) of the Alaska Lands Act)					
Nonmotorized Access by foot, dogsled, kayaks, rafts, etc., on trails, waterways and cross-country.	Permitted; access may be restricted at certain times for resource protection or public safety	Same as (I)	Same as (I)	Same as (I)	Same as (I)
Pack Animals Access by dog, horse, mule, lama, or other domesticated animal.	Permitted for traditional activities, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)	Same as (I)
Motorboats Includes in-board and out-board powerboats, and jet boats that provide access to the refuge. Excludes air boats and air-cushion boats.	Permitted for traditional activities, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)	Same as (I)
Airplanes Includes all fixed-wing planes that provide access to the refuge.	Permitted for traditional activities, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)	Same as (I)
Helicopters All rotary-wing aircraft that provide access to the refuge.	May be permitted, but only by special use permit	Same as (I)	Same as (I)	Same as (I)	Same as (I)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>PUBLIC ACCESS (Restrictions subject to Sections 811 and 1110(a) of the Alaska Lands Act)</u>					
<u>Snowmobiles</u> All snowmachines weighing under 1,000 pounds and with an overall width of less than 46 inches driven by tracks and steered by a ski in contact with the snow.	Permitted for traditional activities, on or off designated trails, in periods of adequate snow cover, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Other Motorized Vehicles</u> Includes all other motorized vehicles (e.g., cars, 4x4s, tracked vehicles, off-road vehicles, airboats and air-cushion boats).	Permitted only on designated routes or areas; air boats and air-cushion boats are not permitted	Same as (I)	Not permitted for public use	Same as (III)	Same as (III)
<u>PUBLIC USES</u>					
<u>Hunting, Fishing and Trapping</u> Form of outdoor recreation and fish and wildlife population control.	Permitted; pertinent state and federal regulations apply	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Primitive Camping</u> Sites selected by users to pitch tents overnight. The Service will not maintain or improve these sites.	Permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Wildlife Observation</u> Wildlife, habitat, and landscape features viewed in their natural setting. Includes photography and bird watching.	Permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Interpretation and Environmental Education</u> To broaden public awareness and appreciation of fish and wildlife resources and their habitats, cultural resources, and scientific resource management practices. To inspire visitors to further their own comprehension of wildlife habitat and resource issues as they relate to society's needs and to foster wildlife and wildland stewardship.	Facilities and materials may be provided, including posted nature trails, wildlife/wildland related signs, visitor facilities, and wildlife displays	Materials may be provided; facilities not provided	Same as (II)	Same as (II)	Same as (II)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
PUBLIC FACILITIES					
<u>Visitor Contact Facilities</u> A variety of staffed or unstaffed structures where the public can obtain information on the refuge and its resources.	May be provided	Not provided	Same as (II)	Same as (II)	Same as (II)
<u>Improved Campsites</u> Permanent sites that may include fire rings, shelters, and sanitary facilities.	The Service may provide or permit improved campsites if needed to limit resource degradation	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Other Temporary Facilities</u> Establishment and use of tent platforms, shelters, and other temporary facilities and equipment directly related to the taking of fish and wildlife.	May be permitted, subject to reasonable regulations, under the provisions of Section 1316 of the Alaska Lands Act; tent platforms require a special use permit	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Boat Launch Sites</u> Designated access sites where boats can be put into lakes and rivers. May vary from simple clearings to permanent ramps.	May be permitted	Same as (I)	Not permitted	Same as (III)	Same as (III)
<u>Foot Trails</u> Designated routes that are restricted to walking. Not cleared or maintained.	May be provided	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Roads</u> Designated, maintained corridors that provide access for motorized vehicles. Includes asphalt roads, gravel roads, and cleared strips.	Not provided; may be permitted subject to Title XI of the Alaska Lands Act	Same as (I)	Not permitted, except according to the provisions of Title XI of the Alaska Lands Act	Same as (III)	Same as (III)
<u>Air Strips</u> Designated sites that provide access for aircraft. Includes cleared strips, asphalt and concrete strips.	Primitive airstrips may be designated; no new construction allowed	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Remote Navigation Aids/Communication Stations/Weather Stations</u> Includes air and water navigation aids, facilities to provide communication capabilities, facilities for national defense, and facilities for weather, climate, and fisheries research and monitoring.	Permitted on a site-specific basis, subject to reasonable regulations	Same as (I)	Same as (I)	Same as (I)	Same as (I)

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>ECONOMIC USES*</u>					
<u>Surface Geological Studies</u> Includes surface rock collecting, and geological mapping activities for (includes helicopter or fixed-wing access)	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Core Sampling</u> Extraction of subsurface rock samples with small portable (usually helicopter transported) drill rigs. Does not include exploratory drilling for oil and gas.	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Not permitted unless conducted by or for a Department of Interior agency under Section 1010 or the Alaska Lands Act	Same as (IV)
<u>Seismic (Geophysical) Studies</u> Examination of subsurface rock formations through devices that set off and record vibrations in the earth. Usually involves mechanized surface transportation, but may be helicopter supported.	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Same as (I)	Not permitted unless conducted under the provisions of Section 1010 of the Alaska Lands Act
<u>Other Geophysical Studies</u> Helicopter-supported gravity and magnetic surveys and other minimal impact activities that do not require mechanized surface transportation.	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Oil and Gas Leasing</u> Leasing, development and production of onshore oil and gas for commercial purposes. Includes all associated above and below ground facilities.	Not permitted unless authorized by Congress under Section 1003 of the Alaska Lands Act	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Oil and Gas Support Facility</u> All onshore developments necessary to service an offshore production platform. This may include pipelines, storage yard, port facilities, processing facilities, machine shops, housing, roads, airstrip, and waste treatment plants.	May be permitted if compatible with refuge purposes, subject to refuge special use permit conditions	Not permitted	Same as (II)	Same as (II)	Same as (II)

*Geothermal development, coal leasing, oil and gas leasing, and hardrock mining are prohibited by law.

Table 10. Summary of management activities, public uses, and economic uses permitted in the management categories (continued).

	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Wild River Management (IV)	Wilderness Management (V)
<u>ECONOMIC USES</u>					
<u>Sand and Gravel Removal</u> Extraction of sand and gravel for commercial purposes.	May be permitted subject to refuge special use permit conditions	Not permitted	Same as (II)	Same as (II)	Same as (II)
<u>Hydroelectric Power Development</u> This includes full commercial development of a site (a dam, impoundment area, penstocks, powerhouse, tailrace, and other associated facilities).	Not permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Transmission Lines/Pipelines</u> Includes telephone and electrical power lines, oil and gas pipelines, and other necessary related facilities. Does not include facilities associated with on-refuge oil and gas development.	May be permitted, subject to the provisions of Title XI of the Alaska Lands Act and 43 and 50 Code of Federal Regulations	Same as (I)	Not permitted, except according to the provisions of Title XI of the Alaska Lands Act	Same as (III)	Same as (III)
<u>Guiding, Outfitting, Transporting</u> Big game guides, outfitters, sport fishing guides, river guides, air-taxi operators, and all other commercial operators that provide services to recreationists on the refuge. Includes all activities of the operator and facilities used by the operator on the refuge (e.g., tent camps and access methods).	Permitted on a site-specific basis, subject to reasonable regulations (e.g., duration of trips, timing, party size, location of facilities)	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Commercial Timber Harvest</u> Removal of timber from the refuge for commercial purposes, including house logs or firewood.	May be permitted on a site-specific basis, subject to reasonable regulation.	Same as (I)	Not permitted	Same as (III)	Same as (III)
<u>Grazing</u> Grazing of domesticated animals for commercial purposes.	Not permitted	Same as (I)	Same as (I)	Same as (I)	Same as (I)
<u>Agriculture</u> Introducing plant species to maintain or increase native wildlife populations.	May be permitted on a case-by-case basis if compatible with refuge purposes	Not permitted	Same as (II)	Same as (II)	Same as (II)
<u>Commercial Fishing (Onshore Facilities)</u> Includes all land-based sites, activities, and facilities on the refuge (e.g., campsites, cabins, motorized vehicles, landing strips, etc.).	May be permitted subject to reasonable regulations in accordance with the provisions of the Alaska Lands Act	Same as (I)	Same as (I)	Same as (I)	Same as (I)

Moderate Management (II)

Moderate management areas are intended to provide opportunities for public use and limited commercial development, while protecting fish and wildlife populations and habitats. Hunting, fishing and trapping are permitted, subject to regulation. Motorized access for traditional activities would be permitted, subject to reasonable regulations. Public use facilities, such as cabins and campsites, could be provided. Moderate management areas could therefore provide increased opportunities for public use, including hunting, fishing, and trapping. Guiding and outfitting services and related temporary support facilities would be permitted. Other commercial activities that could be permitted, with stipulations to protect fish and wildlife populations and habitats, include oil and gas studies, and commercial timber harvests. Management practices that may be permitted in this category, if compatible with refuge purposes, include mechanical manipulation of vegetation, construction of water impoundments and dikes, and construction of permanent fish weirs and hatcheries. The Service would focus its efforts on monitoring uses and developments to minimize impacts on the area's resource values.

Minimal Management (III)

Management under this category is directed at maintaining the existing conditions of areas that have high fish and wildlife values or other resource values. Minimal management areas are suitable for wilderness designation, although the Service's wilderness proposals do not necessarily include all lands in the minimal management category. Areas proposed for wilderness designation would be placed in minimal management until actually designated by Congress. Opportunities for public use and access would be available for subsistence purposes and for traditional activities such as hunting, fishing, and trapping. Traditional motorized access via floatplanes and motorboats would be permitted. Guiding and outfitting services and related temporary support facilities would be permitted in minimal management areas. Oil and gas studies would be permitted where compatible with refuge purposes. Prescribed burning and minor habitat improvements could be permitted in minimal management areas where compatible with refuge purposes. Fishery development facilities may be built in these areas if they are compatible with the purposes of the refuge and it can be demonstrated that they are necessary to achieve management objectives. The Service would focus its efforts primarily on management studies and survey/inventory programs to increase the refuge's resource data base, and examine refuge management techniques.

Wild River Management (IV)

The Ivishak, upper Sheenjek and Wind rivers were designated by Congress as wild rivers under Section 602 of the Alaska Lands Act. These rivers are thus part of the Wild and Scenic River System. The intent of this management category is to protect and enhance the values for which these rivers were designated while providing for public recreation and resource uses that do not adversely impact or degrade those values.

The wild river management category is similar to the minimal management category. The Service will protect and maintain the physical and biological qualities of the drainages and adjacent refuge lands, including water quality and quantity. Prescribed burning and minor habitat improvements could be permitted in the wild river corridors where compatible with refuge purposes. Recreational use would be managed to maintain the drainages' resource and recreational values. Guiding and outfitting services and related temporary support facilities would be permitted. Motorized access for traditional activities, such as hunting, fishing, trapping, and subsistence house log and firewood cutting, would be permitted. Commercial timber harvesting, oil and gas leasing, and hydropower projects will not be permitted. Oil and gas studies may be permitted subject to site-specific compatibility determinations. Developed recreational facilities, unless necessary to limit resource damage, would not be permitted. Outside of the refuge and on inholdings within the refuge the Service would work with private landowners to ensure management continuity. The Service would also work with the State to ensure that water quality and fish and wildlife habitats and populations are maintained.

Wilderness Management (V)

This category only applies to the Arctic Wilderness. About 41% of Arctic Refuge is designated wilderness. The Service will manage the Arctic Wilderness in accordance with the provisions of the Wilderness Act of 1964, the Alaska Lands Act, and the guidelines of the Service's Refuge Manual (6 RM 8). In accordance with the Wilderness Act, the Service will manage the area to maintain wilderness resources and values, preserve the wilderness character of the biological and physical features, and provide opportunities for research, subsistence, and wildlife-oriented recreation. Prescribed burning and minor habitat improvements (subject to the minimum tool concept) could be permitted in the wilderness area where compatible with refuge purposes. Hunting, fishing and trapping will be allowed. Access by foot, aircraft, motorboat, and snowmachine will be permitted. Generally commercial activities will be precluded from the wilderness area; however, traditional commercial recreational activities (i.e., guiding and outfitting services and related temporary support facilities) will continue to be permitted. Seismic studies, core sampling, and other oil and gas activities involving mechanized surface transportation or motorized equipment are not allowed unless conducted by an Interior Department agency or contractor in accordance with Section 1010 of the Alaska Lands Act. New cabins will be permitted only if required for administrative, public safety or subsistence purposes. Chain saws may be used only for subsistence purposes. Other motorized equipment, such as generators and water pumps, will not be permitted unless as a minimum tool for administrative purposes. (Minimum tool is defined as the minimum action or instrument necessary to successfully, safely, and economically accomplish wilderness management objectives.)

MANAGEMENT OF THE "1002" COASTAL PLAIN AREA

The management and use of the "1002" coastal plain requires special attention here. Section 304(g) of the Alaska Lands Act mandates that a comprehensive conservation plan be prepared for all of the Arctic Refuge. Section 1002 of the Alaska Lands Act, however, requires that another report be prepared for Congress on the "1002" coastal plain area. The 1002(h) report analyzes a

variety of alternatives and makes a recommendation to Congress on the future management of the "1002" area. This report and recommendation follow the National Environmental Policy Act process. (The Secretary of Interior's recommendations in the 1002(h) report are included in Appendix L.)

The Service is presently managing the "1002" coastal plain area as if it were a minimal management area. Until Congress takes action, this is how the Service will continue to manage the area. Thus, in all of the alternatives in the refuge comprehensive conservation plan the federal lands in the "1002" coastal plain area are treated as a minimal management area, pending congressional action. Actions that Congress might take in the "1002" area, including permitting oil and gas leasing and designating the area as wilderness, are not addressed in this document.

If and when Congress takes action on the management of the "1002" area the Service will revise the refuge comprehensive conservation plan to incorporate congressional directives. Management of the "1002" area may have a significant bearing on management of the rest of the refuge (e.g., on the need for transportation and utility corridors, air and water quality, fish and wildlife management). If necessary, major revisions outside the "1002" area will be made in the plan following the National Environmental Policy Act process.

MANAGEMENT OF NATIVE CONVEYED LANDS SUBJECT TO SECTION 22(g)

The Kaktovik Inupiat Corporation (KIC) is entitled to the surface estate of about 92,000 acres (37,000 ha) of refuge lands within the refuge coastal plain under Section 14(a) of the Alaska Native Claims Settlement Act (ANCSA) and Section 1431 of the Alaska Lands Act. The Arctic Slope Regional Corporation (ASRC) received entitlement to the subsurface rights of these lands under the Chandler Lake land exchange agreement.^{a/} The Native corporation lands are subject to the provisions of Section 22(g) of the Native Claims Act. Implementation of Section 22(g) relating to oil and gas and related sand and gravel activities on these lands are covered by the terms and conditions of the Chandler Lake land exchange agreement.

When Congress enacted this statute in 1971, it permitted village corporations to select and obtain title to the surface estate of lands within established national wildlife refuges, such as the Arctic Refuge, to satisfy their entitlements under the Act. These private lands have a unique status under

^{a/} The Chandler Lake agreement was signed on August 9, 1983 between the United States and the Arctic Slope Regional Corporation (ASRC). Under the agreement the United States transferred subsurface rights under the Kaktovik Inupiat Corporation (KIC) lands (92,160 acres) to the regional corporation in exchange for private surface inholdings in Gates of the Arctic National Park. The agreement allows the Arctic Slope Regional Corporation to explore for oil and gas on Kaktovik Inupiat Corporation lands in a manner that avoids significant adverse impacts to fish and wildlife, their habitats, or the environment. Stipulations are also included on sand and gravel extraction related to oil and gas activities. Oil development and production is prohibited on the Native corporation lands pending authorization by Congress.

federal law. Congress attempted to balance "the real economic and social needs" of Alaska Natives for acquiring refuge lands against those of the nation in preserving the natural resources values of the National Wildlife Refuge System. Under Section 22(g) of the Alaska Native Claims Settlement Act, requirements were enacted to ensure that the Native corporations' use and enjoyment of their lands would not defeat the purposes for which the wildlife refuges in Alaska had been established. One of the requirements of Section 22(g) is that refuge lands conveyed to the Native corporations remain subject to the laws and regulations governing use and development of the refuge. Although the Native corporation lands are privately owned and no longer part of the refuge, the Service retains residual controls on the use and development of the lands conveyed to village corporations under the Alaska Native Claims Settlement Act.

The Service is concerned with protecting the important resource values of these private lands, while also enabling the Native landowners to derive economic benefits from their land. Congress will determine whether oil and gas production occurs on lands in the "1002" coastal plain area, including the Native corporation lands. Oil and gas activities on the Native corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to environmental standards established by Congress for the "1002" coastal plain area.

For all other uses and developments the Service will work cooperatively with Kaktovik Inupiat Corporation and the Arctic Slope Regional Corporation to ensure that fish and wildlife resource values are conserved on Native lands.

MANAGEMENT OF SELECTED LANDS

About 117,000 acres (47,000 ha) of lands selected by Native village and regional corporations has not yet been conveyed to private ownership. Much of this land eventually will be conveyed to Native ownership, although some lands may be returned to the refuge. The Service retains management responsibility of these lands, though the appropriate Native corporation will be consulted prior to management actions being permitted. Management directions for these lands would be the same as on adjacent refuge lands.

MANAGEMENT DIRECTIONS COMMON TO ALL ALTERNATIVES

The National Wildlife Refuge Administration Act, the Alaska Lands Act, and several other laws and implementing regulations govern administration of national wildlife refuges in Alaska. Regardless of which alternative is selected, management of the Arctic Refuge will comply with these laws and regulations. All of the alternatives also address the issues raised in the public meetings and the significant problems identified by the refuge staff and planning team. Consequently, all of the alternatives share some common management directions. The following management directions will be implemented under all of the alternatives. (There are a few exceptions to these common management directions, which are noted in the appropriate places.)

1) Management Emergencies

It may be necessary, when management emergencies occur on the refuge, to supersede certain of the management directions that are discussed in this section of the plan. Activities permitted or prohibited within each management category (as shown in Table 10) may not be adhered to when emergencies occur. For example, if naturally occurring or man-caused actions (e.g., landslides, floods, fires, drought) are adversely affecting refuge resources, it may be necessary to undertake mechanical habitat manipulation, water management activities, fisheries enhancement practices, or other activities that would not otherwise be permitted on all or portions of the refuge. The Service would use the minimum tool appropriate to address the emergency.

2. Compatibility Determination Process

The Arctic Refuge Comprehensive Conservation Plan sets broad guidelines and policies for determining uses compatible with refuge purposes. Actions proposed by federal, state and local government agencies, commercial users, or other groups may be subject to compatibility determinations. The plan identifies some administrative, commercial, and public uses that are normally permitted and some that are incompatible. For another large group of uses that may be permitted in the plan a site-specific evaluation must be prepared before a compatibility determination can be made. In these instances the refuge staff will evaluate the proposed use and make a decision on whether or not the use is compatible. The Service's Refuge Manual (5 RM 20) provides general guidance on how compatibility determinations will be conducted (see Appendix O).

All compatibility determinations will be reviewed by the regional office to ensure that the findings are consistent with the Service's policies. A record of the compatibility determinations will be kept on file and will be used as precedents for future decisions on refuge uses.

3) Management of the Firth River-Mancha Creek Research Natural Area (RNA) and the Shublik Research Natural Area (RNA)

The Firth River-Mancha Creek Research Natural Area, encompassing 520,000 acres (210,000 ha) and the Shublik Research Natural Area, covering about 34,500 acres (14,000 ha), were both established on August 5, 1975. The Firth River-Mancha Creek Research Natural Area encompasses the entire Firth River drainage system within the United States. The Shublik Research Natural Area is located along the Canning River and takes in the southwestern flank of the Shublik Mountains. (See Chapter III for a description of the special values of these areas.)

The purposes of research natural areas are to preserve adequate examples of all major ecosystem types in the country, provide opportunities on these areas for research and education, and to preserve a full range of genetic and behavioral diversity in native plants and animals.

Although no formal management plan or objectives have been developed for these research natural areas, the description on which the Firth River-Mancha Creek Research Natural Area designation was based stated that "the area will be maintained in a natural condition permitting succession to advance to a climax without interference." A similar goal was stated for the Shublik Research Natural Area in its area description: the area was to be dominated by natural processes of succession, with no improvement or disturbance of the habitat. Under all of the plan's management alternatives the Firth River-Mancha Creek and Shublik research natural areas will be managed in accordance with this principle and current Service policy regarding management of research natural areas. This policy, contained in the Service's Refuge Manual (8 RM 10), states that the management of each research natural area will be governed by a natural area management plan that is compatible with established refuge objectives. Management plans for the Firth River-Mancha Creek and Shublik research natural areas will be completed as part of the step-down planning process following completion of the plan. In accordance with Service policy, these management plans will ensure that the areas are "reasonably protected from any influence that could alter or disrupt the characteristic phenomena for which the area[s were]...established" (8 RM 10.8).

4) Management of the Neruokpuk Lakes Public Use Natural Area

The Neruokpuk Lakes Public Use Natural Area (PUNA) was established on May 2, 1977. It encompasses 204,000 acres (82,000 ha) within the Brooks Range surrounding Peters and Schrader lakes. The extreme headwaters of the Sadlerochit River down to the Fire Creek tributary are entirely within the area as are Whistler, Spawning, Carnivore, and Coke creeks. The area was chosen as a public use natural area because of its relative ease of access, scenic beauty, and abundant wildlife. (See Chapter III for a description of the special values of this area.)

The purposes of public use natural areas are to preserve significant natural areas for public use and to preserve these areas essentially unmodified by human activity for future use. No formal management plan or objectives have been established for the Neruokpuk Lakes Public Use Natural Area, although under all of the plan's management alternatives it will continue to be managed in accordance with current Service policy on management of public use natural areas. This policy, contained in the Service's Refuge Manual (8 RM 11), states that each public use natural area will be managed in accordance with a management plan that will protect the area from "any influence that could disrupt the conditions that maintain and perpetuate those ecological and geological phenomena which the area was intended to exemplify" (8 RM 11.8). A step-down management plan for the Neruokpuk Lakes Public Use Natural Area will be written following completion of the refuge comprehensive conservation plan.

The Service policy for natural areas states that generally no permanent structures are permitted within either research or public use natural areas (8 RM 10.8D and 8 RM 11.8D). The Neruokpuk Lakes Public Use Natural Area is also located within the Arctic Refuge Wilderness. The Wilderness Act generally prohibits permanent structures within wilderness areas. However, the field station at Peters Lake, consisting of four permanent buildings, was in existence prior to the establishment of the Neruokpuk Lakes Public Use Natural Area, the Arctic Refuge Wilderness and the Arctic National Wildlife

Range itself. The field station thus does not necessarily have to be removed. In Alternatives A through F the Service will analyze whether there is a need to maintain the field station's facilities when it develops the Neruokpuk Lakes Public Use Natural Area management plan. (In Alternative G the field station facilities would be removed.) If the facilities are found to be necessary to fulfill the purposes of the refuge, they will continue to be maintained; if they are not determined to be necessary then plans for removal will be developed. (See also the "refuge facilities common management direction," discussed later in this chapter.)

5) Land Exchanges and Acquisitions

Under Section 1302 of the Alaska Lands Act the Service may acquire by purchase, donation, exchange or otherwise any lands within the boundaries of Alaska refuges.

The Department of Interior has negotiated draft exchange agreements with six Native groups. The proposed exchanges would result in the acquisition of lands in seven national wildlife refuges in Alaska. This acquisition would, if approved by the Secretary of Interior and Congress, be accomplished by trading limited oil and gas fee interests located within the Arctic Refuge's coastal plain comparable in value to the Native lands being acquired. The exchanges will not be carried out unless Congress first enacts legislation opening the coastal plain to further oil and gas activities. Then, Congress must also pass legislation ratifying the agreements negotiated by the Secretary. Thus, the ultimate decision on whether these exchanges will occur will be made by Congress.

The proposed exchanges are designed to protect the integrity, resources and purposes of the Arctic Refuge, and to further the mandated purposes of the refuges established by the Alaska Lands Act. If Congress approves the exchanges, the Native corporations will receive title only to the oil and gas in certain designated tracts in the coastal plain. The United States will retain ownership of the surface estate and other mineral interests in those tracts. Ownership of those oil and gas interests will return to the United States following exploration, development, and production if any occurs. Before returning title to the United States, the Native corporations must reclaim any lands affected by their oil and gas activities and clear any third-party interests that have been created during the interim.

The Service will consider land exchanges and cooperative agreements with willing parties on other refuge inholdings for the purpose of protecting fish and wildlife populations and their habitats, satisfying other purposes for which the refuge was established, or facilitating refuge management. Other exchanges that are for non-refuge public purposes or are for the benefit of the landowners also will be considered. Only the minimum interest in land necessary to reach management objectives will be considered for negotiations, and care will be taken to minimize the impact on all parties concerned. In any land exchange proposals for Native allotments the Bureau of Indian Affairs

will be involved, as required under Title 25, Code of Federal Regulations, Part 152.

The Service will discuss with any concerned parties, the resource values, management needs and requirements, potential impacts, and the feasibility of any potential exchanges.

6. Cooperation with Owners of Refuge Inholdings and Adjacent Lands

The Service will work to foster a spirit of cooperation and good will with its neighbors and the public under all alternatives. Specifically, the Service will keep the public informed about refuge management policies and activities; consult periodically with landowners, communities, special interest groups, and other constituents who have expressed an interest in, or are affected by, refuge programs; and respond promptly to conflicts that arise over refuge programs.

As set forth in Section 304(f) of the Alaska Lands Act, the Service may seek cooperative agreements with owners of lands within, adjacent to, or near the refuge. The Service may provide technical and management assistance under these agreements. In exchange for the assistance, the owner must agree to manage the land in a manner compatible with refuge purposes, to permit the Service reasonable access to refuge lands, and to provide such other public benefits as may be negotiated.

The purposes and requirements for land bank agreements are described in Section 907 of the Alaska Lands Act. Briefly, land bank agreements require an owner to manage the land in a manner compatible with the management plan, and to provide the Service with reasonable access for purposes of administering the refuge or carrying out obligations under the agreement. In exchange for this agreement, the Service may provide technical and other assistance. Native corporations and other groups receiving land under the Native Claims Act also receive immunity from taxes, court judgments, and adverse possession for those lands in the land bank.

7) Cooperation and Coordination With Other Government Agencies

The Service will continue to work closely with those federal, state and local government agencies, and Canadian federal and territorial agencies, whose programs affect, or are affected by, the Arctic Refuge. Whenever possible, the Service will share equipment and aircraft costs, conduct joint wildlife surveys, exchange data, co-fund research, seek cooperative agreements, and participate in interagency activities to meet mutual management needs.

The Service and the State of Alaska will cooperatively manage the fish and wildlife resources of the Arctic Refuge. A memorandum of understanding between the Service and the Alaska Department of Fish and Game defines the cooperative management roles of each agency (see Appendix H). The Department of the Interior, Fish and Wildlife Policy: State and Federal Relationships (Title 43, Code of Federal Regulations, Part 24) further addresses intergovernmental cooperation in the protection, use, and management of fish and wildlife resources. The closely related responsibilities of protecting

habitat and wildlife populations and providing for fish and wildlife utilization require close cooperation of the Alaska Department of Fish and Game, the Service, and all resource users.

The Service will work with the Alaska Department of Fish and Game, the Canadian Wildlife Service, the Northwest Territories Wildlife Branch and the Yukon Wildlife Branch, the Canadian Porcupine Caribou Management Board, and the International Porcupine Caribou Herd Board to carry out appropriate management projects. All projects will be reviewed on a case-by-case basis to ensure they are compatible with refuge purposes.

8) Coastal Zone Consistency

The Arctic Refuge is adjacent to the State of Alaska's coastal zone. Under Section 307(c) of the Coastal Zone Management Act the activities of all federal agencies directly affecting the coastal zone should be consistent, to the maximum extent practicable, with the approved state coastal zone management plan. A consistency determination has been prepared for the management alternatives in the Arctic Refuge Comprehensive Conservation Plan and is included in Appendix I. The management alternatives are consistent to the maximum extent practicable with the Alaska Coastal Management Program.^{a/} The Service will examine all relevant proposed activities and developments to ensure that they are consistent, to the maximum extent practicable, with the coastal management program. The North Slope Borough Environmental Protection Department will be consulted when proposed changes would significantly affect coastal resources or represent a major change in management of the refuge.

9) Data Collection and Research/Management Studies

Data collection and management-oriented research has been one of the Service's priorities on the Arctic Refuge since the refuge was established. Many studies have been conducted on the refuge, particularly on caribou, brown bear, muskox, polar bear, wolf, Dall sheep, snow geese, other migratory birds and fish. The Service has conducted detailed baseline studies in the "1002" coastal plain area over the past five years (USDI-FWS, 1982; Garner and Reynolds, 1983, 1984, 1985, 1986, In Press). Additional information is needed on the refuge's existing resources and users, particularly south of the "1002" area. This information is essential for refining the Service, Alaska Department of Fish and Game, and Canadian wildlife agencies' management objectives, developing detailed management plans, determining trends, evaluating management effectiveness, identifying existing and potential problems, and generally meeting the needs of refuge management. Thus, under all alternatives the Service, in cooperation with the Alaska Department of Fish and Game and the appropriate Canadian wildlife agencies, will undertake studies to improve the data base on refuge fish and wildlife populations.

^{a/}In making its coastal zone determination, the Service treated the "1002" coastal plain area as a minimal management area, pending congressional action on the recommendations in the 1002(h) report. After Congress acts the Service will review its finding and make appropriate changes if necessary. See also the discussion of coastal zone consistency in the 1002(h) report, on pages 20-21.

To improve management of the refuge, the Service will collect and analyze information on refuge resources and uses. Work will focus on species most likely to be affected by human activities, on key subsistence species, and on those species that serve as key indicators of overall ecological conditions. Data collection and study needs include:

Vegetation and Wildlife

- o mapping vegetation distribution on the coastal plain;
- o developing a vegetation classification scheme adequate for accurately assessing vegetation composition of the north slope;
- o determining distribution of endangered plant species;
- o studying long-term effects of winter seismic exploration on the vegetation of the coastal plain;
- o improvement of techniques for censusing caribou;
- o determining forage availability and use by caribou;
- o ascertaining the effects of snow ablation patterns on caribou distribution;
- o quantifying habitat characteristics of caribou calving and post-calving areas;
- o determining the relationships between the distributions of bears, wolves and caribou during caribou calving;
- o studying the inter-relationship between caribou and golden eagles;
- o determining habitat requirements for resident muskox herds;
- o comparing dietary overlap between caribou and muskox;
- o conducting waterfowl pair counts;
- o quantifying the nesting habitat use and reproductive success of tundra swans along the coast of the refuge;
- o measuring the use by staging snow geese of the riparian habitat on the refuge;
- o surveying the moose, Dall sheep and other wildlife populations to estimate size and distribution on the refuge;

Fish

- o investigating the Camden and Pokok bay fisheries;
- o determining instream flow requirements to support fish populations;
- o determining fish use of the Canning River delta for overwintering;
- o determining population estimates of anadromous arctic char in the refuge;
- o reviewing water withdrawal projects in the arctic with emphasis on effects on local and regional hydrology;
- o investigating the refuge coastal lagoons' fisheries;
- o determining sport fish harvests on the most heavily-fished streams and lakes;
- o conducting arctic char and grayling management studies to prevent overharvesting;
- o conducting early life history studies of arctic grayling on the coastal plain of the refuge;
- o conducting lake trout management studies in Peters and Schrader lakes to prevent overharvesting;
- o determining subsistence use of fishery resources on the refuge;
- o identifying salmon spawning locations on anadromous rivers;
- o determining salmon escapements on anadromous drainages;
- o identifying isolated fish populations; and

- o inventorying streams and lakes to determine species composition, abundance, and water quality.

One of the four purposes for which the Arctic Refuge shall be managed, as set forth in the Alaska Lands Act, is to ensure necessary water quality and water quantity within the refuge. To satisfy this purpose it is first necessary to have information on the refuge's existing water quality and instream flows. The Service is conducting a project that will gather baseline data on water quality parameters and instream flow rates for the refuge's drainages, beginning with the Canning River, Sadlerochit Spring, Hulahula River, Okerokovik Spring, Tamayariak River, Sadlerochit River and Okpilak River. This project includes studies to determine baseline water quality and quantity necessary to maintain optimum habitat conditions for both fish and wildlife populations.

The Service in conjunction with the Alaska Department of Fish and Game will closely monitor those activities that could adversely impact the refuge and its resources, such as recreational and subsistence hunting, commercial, sport and subsistence fishing, and oil and gas activities. Data on public use and cultural resources will be collected and analyzed.

Section 812 of the Alaska Lands Act directs the Service to undertake research on subsistence uses of the refuge. Issues raised through the State fish and game advisory system or identified by the Service will be the focus of these studies. The Service will conduct the research in cooperation with other federal agencies and the Alaska Department of Fish and Game. Research results will be provided to the State and other interested parties.

The Service will encourage other researchers to study refuge resources, if the studies meet management objectives and are compatible with refuge purposes, and will participate in cooperative studies with other state and federal organizations. Cooperative agreements with the State and with Native organizations, authorized under Section 809 of the Alaska Lands Act, may be particularly useful for subsistence research and monitoring.

10) Resource Management Directions

(a) Wildlife Management

Under all alternatives the Service will protect wildlife populations and habitats in the Arctic Refuge. This includes obligations to fulfill legal requirements and treaty responsibilities relating to marine mammals, endangered species and migratory birds. The Service will also cooperate with the Alaska Department of Fish and Game in managing resident wildlife, particularly caribou, Dall sheep, brown bear, muskox, moose and wolf on and near the refuge.

It is the intent of the Service to maintain wildlife populations in the Arctic Refuge at levels near the carrying capacity of refuge habitats, subject to naturally occurring fluctuations in populations. The Alaska Lands Act mandates that fish and wildlife populations and habitats be conserved in their natural diversity. According to the legislative history, the term "natural diversity" reflects an intent to maintain the flora and fauna on the refuge in

a healthy and natural "mix," and not to emphasize management activities favoring some species to the detriment of others. Although it stresses use of natural means, avoiding artificial developments and habitat manipulation programs, the term is not intended to restrict the authority of the Service to manipulate habitat for the benefit of fish or wildlife populations within a refuge, or for the benefit of the use of such populations by people as a part of the balanced management program mandated by the Alaska Lands Act and other laws. The term is also not intended to preclude predator control on refuge lands in appropriate instances (Congressional Record - H12352 1980; S15131 1980).

Both the endangered American peregrine falcon and the threatened arctic peregrine falcon occur on the Arctic Refuge. Many of these peregrines nest along rivers that are used by floaters, such as the Porcupine River. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. In all of the alternatives the Service will encourage groups to float rivers known to have active nests at other times. All groups also will be encouraged to avoid camping in the immediate vicinity of active nests. The Service will monitor the peregrines and river use to ensure that impacts to these species are avoided.

Habitat - The Service has not identified the need for habitat improvements on the Arctic Refuge. All of the alternatives are based upon the principle that healthy wildlife populations in the refuge do not require habitat improvements to maintain their population levels. In the case of the refuge's game species, the Service does not foresee any need for habitat improvements based on the availability of adequate potential habitat, cost, and the remoteness of the refuge. It also should be noted that the legislative history of the Alaska Lands Act emphasizes the maintenance of natural diversity and natural processes in Alaska refuges. Thus, the Service generally will only permit management activities that are consistent with this intent.

The Service will take care in all of the alternatives to minimize disturbances to habitat, particularly those habitats important to individual species or especially sensitive to disturbance (e.g., caribou calving areas, waterfowl staging areas, raptor nest sites, brown bear feeding and denning areas, tundra swan nesting areas). Habitat quality maintenance most often will entail protection through regulation of human activity and through public education.

Wildlife Population Goals and Objectives - Population goals and objectives are useful guidelines for managing wildlife populations on refuges. One of the refuge purposes is to maintain wildlife populations in their natural diversity. This defines very broadly the refuge objectives for maintenance of wildlife populations. Table 11 shows the best estimates of current population levels for the Porcupine caribou herd, Dall sheep, muskox, moose, brown bear, polar bear, American and arctic peregrine falcon. These species have high subsistence or recreation values, and are important indicators of the health and stability of the refuge's ecosystems. Recognizing refuge populations may be affected by factors beyond the management purview of the Service, the Service's goal is to maintain or increase these populations above present levels.

Table 11. Current population estimates for selected species in the Arctic Refuge.

Species	Estimate of Current Population	Source
Caribou (Porcupine herd)	165,000	AK Dept. of Fish & Game, Game Div.
Moose	2,600	Whitten and Nowlin in Townsend, 1987
Dall sheep	10,000	extrapolated from Smith, 1979
Muskox	400	Arctic Refuge staff
Brown bear	540	AK Dept. of Fish & Game, Game Div.
Polar bear	50-100 ^{a/}	Fish & Wildlife Service
Arctic peregrine falcon	10	Fish & Wildlife Service
American peregrine falcon	50-60	Fish & Wildlife Service

^{a/} The estimate indicates the number of bears that are either on or within 10 miles (16 km) of the refuge in the fall. No polar bears would occur on the refuge in the summer.

Management plans will be developed for each important refuge species following completion of the comprehensive conservation plan, including the five major big game species (Dall sheep, caribou, brown bear, moose and muskox), waterfowl, wolf, polar bear, and furbearers. Management plans have been written for the Porcupine caribou herd, Dall sheep, brown bear, and moose, but these plans were written prior to 1980 and need to be revised and updated. All management plans developed for refuge wildlife species will be done in consultation with other appropriate agencies, most importantly the Alaska Department of Fish and Game, Canadian federal and territorial agencies, local Alaska villages, and fish and game advisory committees. The management plans will reflect management objectives and guidelines in the Alaska Department of Fish and Game's species management plans to the extent that they are compatible with refuge objectives. Plans also will be consistent with existing international agreements and treaties, and any regional federal management plans that are in effect.

(b) Fisheries Management

Under all alternatives the Service will conserve and protect fish populations and habitats in the Arctic Refuge. The Service will also cooperate with the Alaska Department of Fish and Game in their efforts to manage both resident and anadromous fish populations.

The Service is proposing to take several actions under all of the alternatives to achieve the purposes of the refuge with respect to refuge fisheries. Fisheries management on the refuge will be conducted in accordance with a fisheries management plan that will be formulated after completion of the comprehensive conservation plan. The Service will cooperate with the Alaska Department of Fish and Game in assessing the distribution and abundance of fish species and identifying key habitat. The Service will place special management emphasis on arctic char, arctic grayling, arctic cisco, and chinook and chum salmon.

Fishery management on the refuge will be directed to maintaining subsistence fisheries, and secondarily commercial and sport fisheries. Commercial fish harvests do not occur on the refuge, but salmon stocks that spawn on the refuge are subject to harvest in the mixed-stock commercial fishery in the Yukon and Porcupine rivers. The commercial harvest of whitefish outside the refuge, on the Colville River, is also a mixed-stock fishery. Portions of the cisco harvested there originate in the MacKenzie River and migrate through refuge coastal waters. Sport fishing will continue to be permitted in all refuge areas. Sport harvest will be allowed to increase in proportion to projected growth in general public use. However, fishery production capacity is limited and intensive fishing may impact fish populations. In particular, overharvest problems could occur in the Kongakut, Hulahula and Sheenjek rivers. Restrictions may be imposed if necessary to moderate the harvest of some fish populations.

Habitat - In all of the alternatives the Service's goal will be to provide a high level of protection to major and minor drainages that sustain both resident and anadromous fish species. In addition to being an Alaska Lands Act mandate for the Service, the goal is also based on the premise that productive fish populations in the refuge require little habitat manipulation, given effective harvest management strategies and favorable environmental conditions, to maintain their population levels.

Under all alternatives, the Service will provide a high level of protection to major and minor drainages that sustain both resident and anadromous fish species. The Service will take particular care to ensure a minimum of disturbance to spawning and rearing areas and migration routes. Before permitting any activity on the refuge, the potential impacts on fish habitats and populations will be carefully weighed.

The Service also will maintain water quantity and quality to ensure that fish populations are maintained in their natural diversity. In all of the alternatives the Service will support the protection of water quality that will provide conditions consistent with natural processes and not exceed those standards set forth in the Alaska Department of Environmental Conservation's water quality standards or have a detrimental effect on the abundance or diversity of anadromous or resident fish species.

The Service will consider fishery development project proposals that affect the refuge's habitats on a case-by-case basis. In non-wilderness areas these proposals may be permitted, subject to the provisions of the National Environmental Policy Act and a compatibility determination. As noted in the Service's Refuge Manual (6 RM 8.8(H)), on wilderness lands in Alaska maintaining, enhancing and rehabilitating existing fish populations is permitted, where compatible with the purposes of the refuge. In general, fisheries restoration is considered more favorably by the Service than enhancement. Permanent facilities will not normally be permitted in a wilderness area. In the event of a natural disaster that damages significant anadromous and resident fish populations, the Service would permit restoration using the minimum tool concept. For instance, the Service could permit a fishery development facility, such as a fish pass, to restore a fish run affected by a landslide.

Fish Population Goals - Under all of the alternatives the Service's goals are to maintain habitat conditions at a level sufficient to continue supporting fish populations at current or calculated historic levels, and to maintain self-sustaining native fish populations at current or calculated historic levels. As more population data become available for fish species, such as arctic grayling and arctic char, the Service will assist and cooperate with the Alaska Department of Fish and Game in setting goals consistent with available habitat. The Service also will provide data and work with the Alaska Department of Fish and Game in refining population objectives where updates are needed for effective management of the sport and subsistence fisheries.

(c) Water Quality

All facilities and activities on the refuge will comply with the pollution control standards set by the the Federal Water Pollution Control Act and amendments, Alaska water quality standards (Alaska Dept. of Environmental Conservation, 1979), and all other applicable state and federal laws, regulations, and orders governing water quality. The Service will cooperate with the Alaska Department of Natural Resources (Division of Land and Water Management), Alaska Department of Fish and Game (Habitat Division), Alaska Department of Environmental Conservation, and other appropriate agencies responsible for establishing and enforcing water quality standards, and is empowered to set its own standards if needed to protect fish and wildlife.

Water quality parameters for most of the Arctic Refuge are unknown. The Service, working with the State, will develop a water resource management plan which will include important water quality measurements. It is essential to collect baseline data as soon as feasible so that changes due to human activity can be documented and corrected. The Service may cooperate with adjacent landowners in collecting these data.

Important sampling sites for collecting baseline water quality data include streams and lakes near sources of potential pollution on or near the refuge. Present or future developments that may impact water quality include administrative sites, public use cabins, private camps or cabins and oil and gas development. Habitat manipulation can also affect water quality and quantity.

Water quality data will be collected in accordance with standard procedures that have been established by the Service. Water quality measurements should be taken around times of low flow. Both water and sediment should be collected. To ensure that the results have legal standing, sampling programs will be designed and carried out and analyzed by Service-approved agents. Important parameters to measure in all samples include: temperature, pH, conductivity, alkalinity, hardness, suspended solids (turbidity) and settleable solids (sediment). Other parameters to measure depend on the suspected sources of pollution, but include levels of: at least ten heavy metals; petroleum hydrocarbons; polychlorinated biphenyls (PCBs); several nutrients; dissolved gases; and fecal coliform bacteria.

Selected fish and wildlife also should be tested for accumulated contaminant levels if pollution is suspected. Some important indicator species are filter-feeders such as freshwater clams, and predators such as arctic char, whitefish, pike, bald eagle, and brown bear. Non-migratory species such as arctic flounder in coastal waters and arctic grayling in fresh waters also may be important contaminant indicators.

Refuge staff will advise adjacent landowners to ensure awareness of potential pollution threats and to coordinate protection of water quality among all concerned parties. Any pollution of refuge waters will be reported to appropriate state and federal agencies.

(d) Water Rights

The water resources of the Arctic Refuge will be managed to maintain the primary purposes of the refuge, as stated in Section 303(2)(B) of the Alaska Lands Act, and in other statutory mandates. Specific water resource requirements for the primary purposes of the refuge will be identified and the amount of water necessary to maintain these purposes will be quantified in cooperation with the State of Alaska. Once Federal Reserved Water Rights (FRWR) have been quantified, the Service will record this information with the Alaska Department of Natural Resources. Water for secondary purposes and other uses not provided for by the Federal Reserved Water Rights will be applied for in accordance with Alaska Statutes (AS) 46.15.

A water resource management plan will be prepared following adoption of the comprehensive conservation plan for the Arctic Refuge. This plan will identify streams, lakes, and other water bodies whose protection have highest priority and will outline procedures for quantifying their Federal Reserved Water Rights. Instream flow data are urgently needed on all streams that flow through the refuge with potential mining or oil and gas development. Selected streams on the coastal plain currently are highest priority for Federal Reserved Water Rights work. These streams include the Canning River, Sadlerochit Spring, Hulahula River, Okerokovik Spring, Tamayariak River, Sadlerochit River, and Okpilak River. The Service will cooperate with the State in obtaining data on instream flow needs.

Instream flow studies will investigate the full annual range of flow, as both flood and low-water stages are essential, or even critical, in the life cycles of wetland and aquatic species. Extreme flood and drought years also will be included in the analysis, as both are important to the renewal of aquatic habitats. Once year-round instream flow requirements have been quantified, the Service will continue to monitor streams that may be subject to modification outside the refuge. The Service will contact other water users if the Service determines that a proposed project threatens refuge waters, fish, or wildlife. Reductions in instream flows, lake elevations, or groundwater levels below the Federal Reserved Water Rights will be reported to the appropriate state or federal agencies so that action can be taken to maintain the purposes for which the refuge was established.

(e) Shorelands, Tidelands and Submerged Lands

In the original Arctic Range the federal government claims that all navigable waters (and submerged lands beneath these waters) were reserved by Public Land Order 82 prior to statehood. The United States and the State of Alaska dispute ownership of these waters and the submerged lands beneath the coastal lagoons in the area between the mainland and the offshore barrier islands from Brownlow Point to the mouth of the Aichilik River (with the exception of lagoons north of the Kaktovik Inupiat Corporation lands). Until a decision has been rendered by the courts, all activity on these submerged lands will have concurrent federal and state approval.

Pursuant to the Submerged Lands Act of 1953, the Alaska Statehood Act of 1958, and the State constitution, title to all tidelands and submerged lands that were not reserved on January 3, 1958 transferred to the State of Alaska. It is recognized that the Service and the State may have differing interpretations of some aspects of this title transfer, both as to the laws and implementation of the laws based on facts.

Determinations of what waters are navigable is an ongoing process in Alaska at both the administrative and judicial levels. Within the Arctic Refuge, the Bureau of Land Management has determined the navigability of the portions of streams and lakes that are within lands selected by Native corporations or by the State of Alaska. Pursuant to Section 901(g) of the Alaska Lands Act, those determinations are for the purpose of determining title to lands beneath navigable waters as between the United States and the State of Alaska. The only water bodies on the Arctic Refuge that have been determined to be navigable are: the Porcupine River to the international boundary; short segments of the East Fork of the Chandalar River north of Arctic Village; the Coleen River to Lake Creek; and the Sheenjok River to Thluickohnjik Creek. Other water bodies may be determined to be navigable in the future.

The Service will work cooperatively with the State to ensure that existing and future activities occurring on the shorelands, tidelands and submerged lands are compatible with the purposes for which the refuge was established. In the future the Service may propose management actions to the State for these areas. The Service will pursue cooperative agreements with the State for the management of lands under navigable water bodies (shorelands).

(f) Management of Water Columns

The Service has authority to regulate certain activities on water columns to protect refuge lands and for conservation purposes. This authority stems from two provisions of the United States Constitution, (the Property Clause and the Commerce Clause), the Alaska Lands Act, and other authorities including the National Wildlife Refuge Administration Act of 1966, the Fish and Wildlife Coordination Act of 1958, and the Migratory Bird Treaty Act. The State of Alaska also has authority to manage water based on the laws cited in the section on shorelands, tidelands and submerged lands above. These laws provide for water management by both the State and the Fish and Wildlife Service.

The Service will pursue cooperative management agreements with the State of Alaska regarding public uses on waterways in the refuge. Agreements will be pursued only if a case-by-case resolution of management proves unacceptable to the Service and the State.

(g) Air Quality

All activities on the Arctic Refuge will comply with the Clean Air Act, as amended, and all other applicable state and federal laws, regulations and orders. The refuge is a Class 2 air quality area. The Service will cooperate with the Alaska Department of Environmental Conservation and other agencies responsible for establishing and enforcing air quality standards.

As noted in the "Affected Environment" chapter, arctic haze probably is affecting the refuge. Existing and future oil and gas development on the north slope also may adversely impact the refuge's airshed. To protect refuge resources from pollution, the Service will take an active role in monitoring development in and outside the refuge that could affect refuge air quality. Ambient air quality data will be collected, in cooperation with the State, as funding permits. Contact with adjacent landowners will continue to ensure awareness of potential pollution threats and to coordinate protection of air quality among all concerned. Pollution problems identified will be reported to the appropriate state and federal agencies so action can be taken to prevent significant deterioration of air quality.

(h) Visual Resources Management

In all alternatives the Service will identify and maintain the scenic values of the refuge and minimize the visual impact of developments consistent with the constraints imposed by the particular alternative selected. Refuge facilities and commercial use support facilities will be designed to blend into the landscape. The Service will cooperate with state agencies to prevent any significant deterioration of visual resources.

(i) Litter, Waste and Hazardous Material Control

Under Service regulations (Title 50, Code of Federal Regulations, Part 27.94) the littering, disposing or dumping of garbage, refuse, sewage (other than normal wastes resulting from camping and other primitive recreation), or other debris on refuges is prohibited except at points or locations designated by the refuge manager and approved by the Alaska Department of Environmental Conservation. Litter disposal is the responsibility of individual refuge users. If waste disposal and litter control problems occur on the refuge the Service will increase its public education and law enforcement efforts.

Several former military sites on refuge lands contain low levels of hazardous wastes, including the Distant Early Warning (DEW) line stations at Beaufort Lagoon and Collinson Point, non-operational stations at Demarcation Bay and Brownlow Point, and possibly caches at Griffin Point, and the former Naval Arctic Research Laboratory substation at Peters Lake.^{a/} The Service is

^{a/} The Demarcation Bay and Collinson Point sites have been identified as candidate superfund sites. These sites may be withdrawn depending on the results of preliminary assessments and site investigations.

conducting supplemental studies to determine if any environmental contamination from heavy metals, hydrocarbons and polychlorinated biphenyls (PCBs) has occurred at these sites, and determine if additional clean-up will be needed besides the planned Department of Defense Environmental Restoration Account clean-up.

The Service recognizes there is a potential for oil and gas spills affecting the refuge. The sensitive nature of refuge resources, such as salmon spawning areas, and the difficulty of containing spills make any fuel or oil spills a special concern. To minimize damage to the resources in and adjacent to the refuge, the Service will work with other federal and state agencies in initiating, reviewing and responding to oil and fuel spill contingency planning requirements.

(j) Fire Management

The Alaska Interagency Fire Management Plans for the North Slope and Yukon planning areas and the Arctic Refuge Fire Plan provides direction for fire suppression in the refuge. These plans were completed by representatives of the Service, Bureau of Land Management, Bureau of Indian Affairs, the Alaska Department of Fish and Game, the Alaska Department of Natural Resources, Doyon Limited, Arctic Slope Regional Corporation and the Kaktovik Inupiat Corporation.

As a result of the interagency fire management plans most refuge lands are classified in the "Limited Action" category. Fires that occur on lands within this category are not provided any initial attack or suppression actions unless necessary to keep a fire within the Limited Action area or to protect critical sites within the area. Generally, fires in the Limited Action areas are allowed to burn out naturally where not endangering life or property.

Small areas of the refuge adjacent to Venetie-Arctic Village lands are classified as "Modified Action" areas. Lands in this category are provided a high level of protection during critical burning periods (i.e., during extremely dry weather), but a lower level of protection when the risk of fire is diminished. During critical burning periods all fires within these zones receive aggressive initial attack. During times of reduced fire danger no initial attack is provided.

Private lands within or adjacent to the refuge, conveyed and selected Native lands and allotments, and refuge administrative and public use facilities will receive high levels of protection, including initial attack on fires. Generally, areas where human life or habitations would be in danger receive the highest level of protection ("Critical Protection"). (Refer to the interagency fire management plans for detailed discussions on wildland fire ecology and management, suppression options, and environmental assessment.)

(k) Historical/Cultural Resources

All significant historic, archeological, paleontological, and cultural resources on the refuge will be protected as required by law. Before doing anything that would alter historic structures or disturb the ground, the Service will survey the site to determine if cultural resources are present.

Private interests proposing to conduct economic activities on the refuge will be required to fund these site-specific surveys. If cultural resources are discovered, their importance will be evaluated to determine their eligibility for inclusion in the National Register of Historic Places. A determination of appropriate action will be made (e.g., avoidance, partial or total mitigation through salvage, site hardening). All of these actions will be taken in consultation with the Regional Historic Preservation Officer, State Historic Preservation Officer, the Advisory Council on Historic Preservation and other appropriate agencies.

The 1980 Amendments to the National Historic Preservation Act also direct the Service to inventory and evaluate the cultural resources on the refuge. Qualified social scientists may be encouraged to undertake surveys and research on the refuge to assist the Service in this effort (see also the research common management direction).^{a/}

11) Public Access and Transportation Management Directions

In all of the alternatives reasonable access onto the refuge will be ensured so visitors can participate in fish and wildlife-oriented recreational activities. Under all alternatives non-motorized access will be encouraged. The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods for traditional activities is permitted on the refuge under Section 1110(a) of the Alaska Lands Act. The Service would only limit this access if it is determined that it would be detrimental to the resource values of the refuge (with the exception of Alternative G; see below).

Under the Service's regulations (Title 43, Code of Federal Regulations, Parts 36.11(f)(4) and 36.11(g)) the use of helicopters and off-road vehicles (ORVs) is prohibited in Alaska refuges other than in areas designated by the refuge manager or pursuant to the terms and conditions of a special use permit.^{b/} The use of helicopters is authorized throughout the Arctic Refuge, including the Arctic Wilderness, under special use permit. (State statute, however, prohibits use of helicopters for transporting hunters or their gear.)

Recreational use of off-road vehicles, including air boats and air-cushion boats, will be prohibited under all alternatives, except in specifically designated areas and subject to the provisions of Title XI of the Alaska Lands Act. In accordance with Title 43, Code of Federal Regulations, Part 36.11(g)(1)(2):

^{a/}Alternative G differs from the other alternatives here. Although surficial studies may be permitted, in this alternative the Service would not permit excavations and digs unless the site is threatened.

^{b/}In all of the alternatives, except Alternative G, the Service would issue special use permits for the use of helicopters and off-road vehicles that are necessary for research or to manage the fish and wildlife populations and habitats in the refuge.

The use of off-road vehicles in locations other than established roads and parking areas is prohibited except on routes or in areas designated by the appropriate Federal agency in accordance with Executive Order 11644, as amended or pursuant to a valid permit as prescribed in paragraph (g)(2) of this section...

The appropriate Federal agency is authorized to issue permits for the use of ORVs on existing ORV trails located in areas (other than in areas designated as part of the National Wilderness Preservation System) upon a finding that such ORV use would be compatible with the purposes and values for which the area was established...

The process by which such routes and areas can be designated is explained in Title 43, Code of Federal Regulations, Part 36.11(h)(5) as follows:

In determining whether to open an area that has previously been closed pursuant to the provisions of this section, the appropriate Federal agency shall provide notice in the Federal Register and shall, upon request, hold a hearing in the affected vicinity and other locations as appropriate prior to making a final determination.

This process would be accompanied by an official map that delineates those routes or areas being considered.

None of the alternatives call for the Service to provide roads or air strips on refuge lands for public access. No groups have identified the need for these facilities.

(a) Section 1110(a) Access Requirements

Under Section 1110(a) and Section 811 of the Alaska Lands Act the Service will permit the use of snowmachines (during periods of adequate snow cover), motorboats, airplanes, and non-motorized surface transportation methods for traditional activities on all refuge lands, and for travel to and from villages and homesites.^{a/} These uses will be subject to reasonable regulations to protect the refuge's resource values. The Service will take no action to limit access to the refuge unless it is determined to be detrimental to the resource values of the refuge. Public access restrictions or closures would not take effect until the procedural requirements of Section 1110(a) of the Alaska Lands Act and Title 43, Code of Federal Regulations, Part 36.11(h) have been satisfied--the Service would be required to give notice of the intended action, develop regulations, and hold public hearings in the vicinity of the refuge before taking any action to limit or close an area to the above transportation methods. This plan will not by itself restrict or close access.

^{a/} Alternative G differs from all the other alternatives in this management action, in that part of the refuge would be closed to all motorized access. This management action would require congressional approval.

(b) Section 1110(b) Access Requirements

In accordance with Section 1110(b) of the Alaska Lands Act, the State and private interests with valid surface or subsurface rights on or surrounded by the Arctic Refuge are entitled to adequate and feasible access across the refuge. Such access may be subject to reasonable regulations to protect the resource values of the land or to protect public health and safety. This plan cannot by itself restrict or close access.

(c) RS 2477 Rights-of-Way

Revised Statute 2477 (formally codified at 43 U.S.C. 932; enacted in 1866) provides that: "The right-of-way for the construction of highways over public lands, not reserved for public uses, is hereby granted." The Act was repealed by PL 94-579 as of October 21, 1976, subject to valid existing claims. The State has identified roads and trails that it contends rights-of-way were established under RS 2477. The validity of these rights-of-way will be determined on a case-by-case basis.

A map illustrating the rights-of-way that the State contends may be valid under RS 2477 for the Arctic Refuge is included in Appendix K. This map is not necessarily all inclusive. Private parties or the State of Alaska may identify and seek recognition of RS 2477 rights-of-way within the refuge. Supporting material regarding those rights-of-way identified by the State may be obtained through the Alaska Department of Transportation and Public Facilities or the Alaska Department of Natural Resources.

Identification of potential rights-of-way does not establish the validity of these RS 2477 rights-of-way and does not necessarily provide the public the right to travel over them. All RS 2477 rights-of-way within the refuge shall be subject to appropriate state and federal laws and regulations.

(d) Section 17(b) Easements

Sites and linear access easements may be reserved on Native corporation lands that are within or adjoin the Arctic Refuge, as authorized by Section 17(b) of the Alaska Native Claims Settlement Act. The Service will be responsible for management of these public access easements inside the refuge and for those assigned to the Service outside the unit. Pursuant to Part 601, Chapter 4.2 of the Department of the Interior "Departmental Manual" (601 DM 4.2) where these easements access or are part of the access to a conservation system unit, the easement shall become part of that unit and be administered accordingly. The purpose of 17(b) easements is to provide access from public lands across these private lands to other public lands. The routes and location of these easements are identified on maps contained in the conveyance documents. The conveyance documents also specify the terms and conditions of use including periods and methods of public access.

The Service will work cooperatively with the affected Native corporations and other interested parties, including the State of Alaska, to develop a management strategy for the easements. Management of these easements will be in accord with the specific terms and conditions of the individual easements.

As the easements are reserved and the Service assumes management responsibilities for them, the locations, mileages and acreages will be compiled and management strategies will be formulated. This information will be maintained at the refuge headquarters.

As authorized in the Interior Departmental Manual (601 DM 4.3G), the physical location of an easement may be adjusted to rectify a usability problem or to accommodate the surface and/or subsurface landowner's development of the lands if both the Service and the landowner agree to the relocation. Easements also may be expanded if an acceptable alternate easement or benefit is offered by the landowner and the exchange would be in the public interest. An easement may be relinquished to the landowner if an alternative easement has been offered by the landowner or termination of the easement is required by law. The Service also may propose to place additional restrictions (to those authorized in the conveyance document) on the use of an easement if existing uses are in conflict with the purposes of the refuge. In all cases where a change is proposed in authorized uses or location from the original conveyance, the Service will give adequate public notice and opportunity to participate and comment to the affected Native corporation and other interested parties, including the State of Alaska. Service proposals for changing the terms and conditions of 17(b) easements will include justification for the proposed change, an evaluation of alternatives considered, if any, and an evaluation of potential impacts of the proposed action.

(e) Nonexclusive Use Easements

Nonexclusive use easements may be reserved by the Bureau of Land Management across Native allotments when trails or areas of prior established public use overlap an allotment application.

Note: The various types of access routes discussed above may overlap. For example, a valid RS 2477 right-of-way may overlap an easement conveyed under Section 17(b) of the Native Claims Act. Management strategies, where this occurs, will reflect valid existing rights and other considerations unique to the situation. The Service will work cooperatively with interested parties to assure that management is compatible with the purposes of the refuge. Overlap situations will be dealt with on a case-by-case basis in conformance with the management policies outlined in other sections of the plan.

12) Subsistence Use Management Directions

Under Title III of the Alaska Lands Act, one of the purposes of the Arctic Refuge is to provide the opportunity for continued subsistence uses by local residents. Title VIII of the Alaska Lands Act further provides that rural Alaskan residents engaged in a subsistence way of life be allowed to continue using refuge resources for traditional purposes. Subsistence uses on the refuge will be given preference over other consumptive uses when restrictions on harvests are necessary to assure the continued viability of fish and wildlife populations.

Title VIII authorizes the State to manage subsistence uses of fish and wildlife on federal lands if it enacts and implements laws to provide for subsistence preference and if it assures local involvement in management of subsistence resources. On May 14, 1982, the Secretary of the Interior notified the State that its program for subsistence management and use complied with requirements of the Alaska Lands Act. Thus the State is responsible for administering certain subsistence provisions of the Alaska Lands Act. The Service will support the State in meeting those responsibilities under all alternatives. The taking of fish and wildlife for subsistence and other purposes on the Arctic Refuge will be as prescribed by regulations established by the Alaska Boards of Fisheries and Game.

Although the State's program for subsistence management and use generally governs subsistence uses of fish and wildlife on the refuge, other duties remain vested in the Department of the Interior. Among the most important of these statutory duties are those required by Section 806. Under all alternatives the Service will monitor both the status of fish and wildlife populations harvested for subsistence uses and the State fish and game regulatory system. This monitoring is intended to identify potential problems related to allocation of resources before populations of fish and wildlife become depleted, and to ensure that preference is given to subsistence users as required by law.

The Service has developed with the State and other federal land management agencies subsistence monitoring guidelines. The Service will participate in a cooperative subsistence monitoring effort with the Alaska Department of Fish and Game, the local fish and game advisory committees, the regional councils, and the Boards of Fisheries and Game. The Service will attend meetings of these organizations to provide information on the status of subsistence resources and management of the refuge, to identify data needs related to subsistence, to become aware of concerns regarding subsistence uses and refuge programs, and to provide comments to the boards on regulatory proposals that affect subsistence uses of fish and wildlife on the refuge.

The Service will also evaluate the effects of proposed actions on subsistence use under all alternatives in compliance with Section 810 of the Alaska Lands Act. When a decision is to be made on "whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition" of refuge lands, the Service will evaluate the effect of the proposed action on subsistence uses and needs, note the availability of lands for the proposed activity, and consider other alternatives to the proposed action. The Service will work with the Alaska Department of Fish and Game and with other local sources in determining whether a proposed action "significantly restricts" subsistence uses. If a proposed action would probably adversely affect subsistence use, then the Service will follow the formal procedures specified in Section 810 before further consideration of the proposed action.

Access to refuge lands by traditional means will be permitted for subsistence purposes in accordance with Section 811 of the Alaska Lands Act. Traditional means, as defined in Service regulations (Title 50, Code of Federal Regulations, Part 36), include snowmachines and boats (excluding air boats) on the Arctic Refuge. Use of snowmachines will be limited to periods of adequate snow cover. Use of off-road vehicles will be prohibited, except in designated areas (see the "public access and transportation" management direction).

Under Section 816 of the Alaska Lands Act, the Service may close the refuge to the taking of fish and wildlife if necessary for reasons of public safety, administration, or to assure the continued viability of particular populations of fish or wildlife. Except in an emergency, such closure will follow consultation with the State, adequate notice, and public hearings. In an emergency situation, the Service may immediately close the refuge. Emergency closure to subsistence taking would occur only after all other consumptive uses are eliminated.

Although Titles III and VIII of the Alaska Lands Act require the Service to maintain opportunities for, and give preference to, subsistence harvest of fish and wildlife on the refuge, these requirements are subject to all other laws governing management of particular species or species groups.

The Service will continue to maintain frequent communication and liaison with local village people and local subsistence users not living in villages. Such communication will allow the Service to better monitor subsistence use and needs.

13) Public Use Management Directions

Recreational (non-subsistence) hunting and fishing, trapping, and other wildlife-oriented public uses (e.g., hiking, primitive camping, photography, wildlife viewing, river floating, cross-country skiing) will be allowed in the refuge under all alternatives. The Service will continue to support wildlife-oriented recreation on the refuge. Nonconsumptive recreation is recognized as an important part of the refuge's public use program.

The Service will manage recreational use to avoid overcrowded conditions and minimize adverse impacts to historical/cultural, fish and wildlife, wilderness and other special values. Actions that may be taken to minimize impacts include regulating access (subject to the provisions of Section 1110(a) of the Alaska Lands Act), recommending changes in State hunting or fishing regulations to the State Boards of Fisheries and Game, limiting aircraft access, limiting the size and number of recreational group visits, limiting commercial guiding and outfitting activity, and encouraging, through interpretive and educational programs, user behavior that is sensitive to wildlife and wilderness resources. A few recreational opportunities may be seasonally or otherwise restricted to minimize user conflicts or avoid adverse impacts. Management plans may be written for areas of relatively concentrated recreational use, such as the Hulahula River.

Recreational use by unguided visitors will be managed through informational programs and voluntary compliance. Unguided groups will be encouraged to check with the Service before entering the refuge. Backcountry permits eventually may be required for all recreational groups. In all of the alternatives regulations may be promulgated on a seasonal or area-specific basis with regards to how long groups can stay at one location. This action would be taken to minimize potential conflicts with bears, to disperse use and thus reduce other potential resource impacts, or to ensure that other users have an opportunity to use an area. The need for these restrictions will be addressed in the public use management plan. No restrictions are planned at this time.

Other direct restrictions of use, such as limiting numbers of users in an area or limiting the number of boat launches for river trips on peak days, will be avoided unless voluntary methods fail. Commercial recreational use (i.e., guided groups) will be regulated by permits or concessions, as required under Service regulations (see the "common management direction" on guiding).

As called for under Section 1316(a) of the Alaska Lands Act, in all of the alternatives the Service will permit the use of campsites related to the taking of fish and wildlife on all refuge lands so long as they are not detrimental to the unit's purposes. Generally, the Service will not build improved campsites on refuge lands.

Tent platforms, shelters, and other temporary facilities related to the taking of fish and wildlife may be permitted in the refuge provided they are not detrimental to the unit's purposes. Tent platforms will require a special use permit on refuge lands.

Based on current and projected levels of recreational use, the Service has not identified the need to provide visitor facilities in the refuge or on adjacent Native lands.

(a) Education/Interpretation

The success of most of the management activities outlined in this plan will depend to a large extent on the actions of refuge users, adjacent landowners, local residents, and other interested citizens. An effective educational/interpretive program will help avoid potential problems by increasing public understanding of and support for refuge management goals and actions.

Educational and interpretive programs prepared by the refuge staff will emphasize the dependence of the refuge's wildlife on undisturbed habitat. These programs, as well as leaflets and audio-visual programs, will demonstrate why the Arctic Refuge is a unique and important area in the world's arctic biome.

The Service will concentrate its initial efforts on informing adjacent landowners and local residents about the refuge and its programs, the important role these programs play in the wildlife population dynamics of the area, and the access rights of the public. The Service also will concentrate its efforts on informing users so that they are aware of and respect private lands adjacent to and within the refuge. This action should help avoid potential conflicts, such as trespass problems, between recreational users and local residents.

Because most visitors depend on air taxi operators, and many depend on guides and outfitters, a special effort will be made to periodically contact commercial operators. This action will enable the commercial operators to better inform their clients of Service programs.

In recognition of the special wilderness values of the Arctic Refuge, the interpretive program for this refuge will depart somewhat from the current interpretive concept for most other refuges. Without discouraging public use, interpretive/educational endeavors will avoid advertising or promoting the special scenic and other values of the refuge particularly in relation to specific sites. This will heighten the quality of experience for the refuge visitor and keep alive the opportunity for self-discovery and the experience of being the first to explore and discover the unique values of the refuge. A deliberate effort to promote or encourage use of the refuge has the potential to result in overuse and subsequent resource damage in the fragile arctic habitats. Such use also may result in degradation of the special wilderness qualities of remoteness and solitude presently characteristic of the refuge.

The primary visitor contact with refuge staff will occur in the refuge office in Fairbanks. Other opportunities for the public to learn about the refuge are provided by the three interagency-supported Alaska Public Lands Information Centers, located in Tok, Anchorage and Fairbanks. The Service will continue to focus its environmental education efforts in assisting teachers in Fairbanks and communities in the Arctic Refuge area. All of these actions should increase local residents' and visitors' awareness and understanding of the local environment, the refuge, and the Service's management programs.

(c) Cabin Management

There are currently no public use cabins on the Arctic Refuge. The Service has no plans for constructing or designating new public use cabins. Under all of the alternatives, however, cabins may be constructed or designated if deemed necessary for refuge management and/or public health and safety.

Management of existing cabins and review of proposals for construction of new cabins for traditional uses will be in accordance with the Service's cabin policy. This policy states, in part, that a permit shall only be issued upon a determination that the proposed use, construction and maintenance of a cabin is compatible with the purposes for which the refuge was established, that use of the cabin is necessary to provide for a continuation of an ongoing activity or use otherwise allowed within the refuge, and that the applicant has no reasonable alternative sites for constructing a cabin outside of the refuge.

Under all of the alternatives as funding and staff become available the Service will conduct a detailed inventory of the number of cabins and their uses on refuge lands. Before declaring a cabin abandoned, the Service will carefully research its pattern of use. All cabins determined to be abandoned will be disposed of in accordance with the Service's cabin policy and Title 41 of the Code of Federal Regulations.

The Service estimates there are 37 cabins on refuge lands that are used for trapping or other customary and traditional subsistence uses, 25 of which are used to some degree; 12 cabins are not being actively used. Twelve of the cabins are presently under special use permit. None of these cabins may be used for private or public recreational use. The Service eventually will place all of the cabins on refuge lands under permit, or declare them abandoned after researching their pattern of use.

There are no commercial fishing or guide cabins on the Arctic Refuge. In all of the alternatives the construction of new cabins for commercial purposes will only be permitted on the refuge if the conditions of Section 1303 of the Alaska Lands Act are met (see the cabin policy above). Also under Section 1303 of the Alaska Lands Act, the construction of new cabins for private recreational use on the Arctic Refuge is prohibited.

14) Wilderness Proposals

The Arctic Refuge contains 8 million acres (3.2 million ha) of designated wilderness. Section 1317 of the Alaska Lands Act requires the Service to study the remaining non-wilderness portion of the refuge as to its suitability for inclusion in the National Wilderness Preservation System.

As explained in the NOTICE TO THE READER, the "1002" area is not included in the wilderness proposals. Management of this area as wilderness can not be considered until Congress acts and selects one of the five management alternatives analyzed in the 1002(h) report and the accompanying legislative environmental impact statement. In the event Congress selects Alternative D, the "no action" alternative in the 1002(h) report, the area will be examined for wilderness suitability and the necessary environmental documentation will be prepared. Under the other alternatives, future consideration of the "1002" area as wilderness is not a factor.

Upon completion of the refuge plan, the Service will forward final recommendations for wilderness to the Secretary of the Interior for his consideration. The Secretary's final proposal will be submitted to the President for concurrence. Section 1317(b) of the Alaska Lands Act requires the President to advise the Congress of his wilderness recommendations.

As identified in the "Wilderness Review" in Chapter IV, virtually all of the non-wilderness lands in the Arctic Refuge are suitable for wilderness designation. Not all of these lands, however, are proposed for wilderness designation in the management alternatives.

The Service was guided in developing its wilderness proposals by Section 101(d) of the Alaska Lands Act, which states that:

This Act provides sufficient protection for the national interest in the...public lands in Alaska, and...provides adequate opportunity for satisfaction of the economic and social needs of the State of Alaska and its people: accordingly, the designation and disposition of the public lands...pursuant to this Act are found to represent a proper balance...and thus Congress believes that the need for...designating new conservation systems...has been obviated...

Section 102(4) defines the term "conservation system unit" to include units of the National Wilderness Preservation System.

Consistent with the intent of Section 101(d), the Service used two criteria in developing the wilderness proposal for its preferred alternative. Lands are proposed for wilderness designation if they are adjacent to existing wilderness area boundaries and logically belong in the wilderness area but have not been designated as wilderness (e.g., adjustments to the wilderness boundary that would incorporate an entire watershed or drainage basin into the wilderness area). Lands are also proposed if they have outstanding resource values that may have been inadvertently overlooked by Congress in the Alaska Lands Act wilderness designations. In all cases, the federal government must own both the surface and subsurface rights of these areas: only lands where the federal government owns both the surface and subsurface rights can be considered for wilderness designation.

The Service's wilderness proposals for the Arctic Refuge ranges from no additional areas in Alternatives A, B and C to all of the refuge lands identified to be suitable for designation south of the "1002" coastal plain area in Alternative G. Under the preferred alternative, Alternative A, the Service would propose no additional lands be added to the existing Arctic Wilderness.

15) Wild River Management Directions

Section 602 of the Alaska Lands Act designated portions of the Ivishak, upper Sheenjek, and Wind rivers within the boundaries of the Arctic Refuge as wild rivers in the National Wild and Scenic Rivers System.

In the Wild and Scenic Rivers Act, Congress stated that:

It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

Specifically, Section 10(a) of the Wild and Scenic Rivers Act states that:

Each component of the national wild and scenic rivers system shall be administered in such a manner as to protect and enhance the values which caused it to be included in said system without, insofar as it is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values.

In the Wild and Scenic Rivers Act, Congress mandated rivers that are classified as "wild" shall "be managed to be free of impoundments and generally inaccessible except by trail, with watersheds or shorelines primitive, and waters unpolluted...representing images of primitive America."

Planning for the Ivishak, upper Sheenjek, and Wind rivers is incorporated into this document because the river corridors are also part of the refuge. Like all natural environments, the corridors can be effectively managed only in conjunction with the lands surrounding them. This plan will specify what uses can take place within the corridors, and the boundaries of the wild river corridors.

The "wild river" management category, described in the management categories section of this chapter, indicates what uses would be permitted in the wild river corridors. This category is based on congressional direction and Service policy. Table 10 further describes what uses would be permitted in the river corridors. To summarize, the Service will manage the wild rivers to protect their biological, physical, esthetic, historic, archeologic, and scenic features, and to provide opportunities for research and recreation. Traditional access and subsistence uses will continue to be permitted. Water resource projects, mining, and oil and gas leasing will not be permitted within half a mile (0.8 km) of the river banks. The wild river corridors will be managed in the same way under all alternatives.

Corridors have been identified for the three rivers on federally-owned refuge lands that are not designated wilderness.^{a/} In preparing detailed corridor boundaries for the three national wild rivers, the Service applied the following policies, derived from provisions in the Alaska Land Use Council's Synopsis for Guiding Management of Wild, Scenic, and Recreational Rivers in Alaska:

- o The acreage contained within each wild river boundary will average not more than 640 acres (259 ha) per river mile, but may vary considerably along any given section.
- o The acreage limitation for the river corridors will be measured outward from the ordinary high water mark along the shoreline and does not include islands in the river nor the riverbed.
- o While islands in the rivers are not used to determine the total acreage for the corridor they are included within the boundary.
- o Those portions of the national wild rivers, which in their natural and ordinary condition were used or were capable of being used as a "highway of commerce" as of Alaska statehood in 1959, are considered navigable for title purposes. A final determination of navigability will need to be made for each wild river. For those portions outside of the original Arctic Range determined to be navigable, the State of Alaska retains ownership of the riverbed between ordinary high water marks and such lands are not included within the boundary of the river corridor.

^{a/}The mandates for management of designated wilderness meet or exceed and are compatible with management standards established by the Wild and Scenic Rivers Act. Establishing river corridor boundaries within wilderness would serve no useful management purpose.

- o If current land records identify a land parcel as non-federal or identify a prior right which will result in a land parcel being transferred from federal ownership, these parcels and their traditional access routes are excluded from the river corridor boundaries. Examples of such prior rights are valid State and Native land selections, and valid Native allotments.
- o Should any privately claimed or State selected lands not pass from federal ownership, these lands and their access routes shall be encompassed by the adjacent river corridor boundary so long as such inclusions do not exceed the acreage limitations contained in Section 103(b) of the Alaska Lands Act.
- o Where private lands are adjoining, they will be excluded from the river corridor by a common external boundary, and access will be provided to the entire block via the most commonly used route, which in this case is the river. If necessary, a 60 foot (18 m) wide right-of-way will be provided to private parcels.
- o In addition to being affected by legislative controls and Service policies, the boundaries should be established to protect any key natural and cultural values associated with the rivers, such as crucial wildlife habitat or important geological formations, and outstanding scenic values observed from the rivers. The final boundaries were then further adjusted to follow subdivisions of protracted survey section lines to simplify the legal description and on-the-ground management.

The Ivishak Wild River runs for about 60 miles (100 km) through the refuge. The wild river corridor covers about 276 river miles (444 km), including the river's main tributaries and headwaters. The total acreage of the corridor, including the Porcupine Lake area, is about 176,000 acres (71,000 ha).

The upper Sheenjek Wild River is 155 miles long (250 km). The wild river corridor covers about 47 river miles (76 km) outside of the existing Arctic Wilderness. The total acreage of the corridor is approximately 30,000 acres (12,000 ha). Approximately 28 miles (45 km) of the river outside of the wilderness area, but within the refuge boundary, are not included in the wild river designation. The land surrounding this portion of the Sheenjek River was not added to the refuge until 1983. Section 604 of the Alaska Lands Act designated the lower Sheenjek River as a study river. The National Park Service has completed a draft study report on the river, which included this 28-mile segment (USDI-NPS, 1984). The initial finding was to recommend the river for designation as a wild river. The final report, including the recommendation on designation, is being prepared by the Park Service. Thus at this time there is a 28 mile gap in the upper Sheenjek Wild River corridor in the refuge.

The Wind Wild River runs for about 98 miles (158 km) through the refuge. The wild river corridor covers about 304 river miles (490 km), including tributaries and headwaters. The total acreage of the corridor is approximately 195,000 acres (79,000 ha).

Detailed maps and legal descriptions of the proposed wild river corridors are included in Appendix M. These boundaries do not vary between the alternatives. It should be noted that the wild river corridor boundaries are subject to final resolution, adjudication, and conveyance of outstanding

ownerships and property rights. Due to map scale and possible inaccuracies of the most recent land status maps, the wild river corridors also may later need to be adjusted.

The Service has begun to evaluate all rivers, including the wild rivers, to determine which rivers require more detailed management planning than is possible in a comprehensive conservation plan. Should it prove desirable, step-down river management plans will be prepared for the Ivishak, upper Sheenjek, and Wind rivers. The river management plans will address in greater detail the resources, uses, and management of the rivers. Specific details would be included on how the broad management directions given in this plan would be implemented. Public involvement and cooperative planning efforts also would be a part of the river management plans.

16) Economic Use Management Directions

(a) Alaska Mineral Resource Assessment Program (AMRAP)

Section 1010 of the Alaska Lands Act requires that all federal lands in Alaska be assessed for their oil, gas, and other mineral potential, although Section 304(c) prohibits "new" hardrock mineral mining on refuges. To complete the assessment program, mineral assessment techniques that do not result in lasting impacts on refuge resources, such as side-looking radar imagery, trenching, and core drilling, will be permitted throughout the refuge under all alternatives. The Service will issue special use permits to the U.S. Geological Survey or other Department of Interior contractors for assessment work, with stipulations to ensure that the assessment program is compatible with refuge purposes. For example, stipulations may limit access during nesting, spawning, or other times when fish and wildlife may be especially vulnerable to disturbance.

(b) Oil and Gas Activities

Oil and Gas Studies - Oil and gas studies include surficial geology studies, subsurface core sampling, seismic surveys, and other geophysical activities. In the "1002" coastal plain area Fish and Wildlife Service regulations (Title 50, Code of Federal Regulations, Part 37) presently do not provide for further oil and gas exploration in this area--none of the above studies would be permitted. In the Arctic Wilderness seismic surveys, core sampling, and other studies that require mechanized surface transportation or motorized equipment will not be allowed except as provided for by Section 1010 of the Alaska Lands Act (i.e., only if conducted by or for a Department of Interior agency). In the wild river corridors core drilling would not be permitted, except again as provided for under Section 1010. In the rest of the refuge south of 68° North latitude all of the above oil and gas studies may be permitted pursuant to Section 1008(b) of the Alaska Lands Act.^{a/} In

^{a/} Alternative G differs from the other alternatives here in that it would not permit any oil and gas studies other than those studies mandated under Section 1010 of the Alaska Lands Act.

minimal management areas and proposed wilderness areas south of 68° North latitude, oil and gas studies may be permitted where site-specific stipulations can be designed to ensure compatibility with refuge purposes and consistency with the management objectives set forth in the comprehensive conservation plan. However, no seismic surveys will be permitted on the refuge prior to the issuance of a record of decision for this plan.

Oil and Gas Leasing - Section 1003 of the Alaska Lands Act prohibits oil and gas leasing, development and production anywhere on the Arctic Refuge. Thus, until Congress takes action to change this provision the Service will not permit oil and gas leasing under any of the alternatives in the refuge comprehensive conservation plan. When Congress makes a management decision that action will be incorporated into the refuge comprehensive conservation plan and implemented.

(c) Oil and Gas Support Facilities

Oil companies have been exploring for oil in the Beaufort Sea immediately offshore of the Arctic Refuge for a number of years. One federal offshore lease sale has already been held. A State lease sale occurred in the Camden Bay area in June of 1987, and another lease sale is scheduled off Demarcation Point in September, 1988. If a commercial deposit is discovered offshore of the refuge, oil and gas support facilities and production facilities such as processing plants could be needed on the refuge. The existing Arctic Wilderness would preclude this development on part of the refuge's coastal plain east of the Achilik River. As noted at the beginning of this chapter, the Service is treating the "1002" coastal plain area as a minimal management area, pending congressional action. Oil and gas support facilities would not be permitted under this management category. Thus, until Congress takes action the Service will not permit oil and gas support facilities in the refuge in any of the alternatives in the refuge comprehensive conservation plan.

(d) Transportation and Utility Systems

Under Title XI of the Alaska Lands Act, transportation and utility systems could be constructed on or across the Arctic Refuge under all alternatives. Any proposed system would be evaluated to determine its potential environmental impacts. The transportation system would be permitted if it was determined that the system would be compatible with the purposes for which the refuge was established and there was no economically feasible and prudent alternative route for the system. Restrictions may apply on the methods of transmission/pipeline placement.

(e) Commercial Air Taxi Businesses

The vast majority of recreational visitors use air taxis to access the refuge. In all of the alternatives commercial air taxi operators taking people into the refuge would be required to obtain special use permits from the Service under Title 50, Code of Federal Regulations, Part 27.97. In March of 1985 the Service's Alaska regional office issued a policy directive to clarify questions and inconsistencies on issuing special use permits for commercial activities. The air taxi permits will give the Service a better idea of the level of use in the refuge. Permit requirements for air taxi

transporters require a report of the number of recreationists they transport to the refuge. The permits also could be used to regulate the number of visitors using parts of the refuge if the level of use increases in the future to the point that serious resource problems are identified.

(f) Commercial Guiding and Outfitting

In 1985, 12 big game hunting guides, 9 backpack/river guides, and an estimated 3 to 4 outfitters took clients into the Arctic Refuge. The number of permitted guides in 1986 was similar--the only change was an increase in hunting guides to 14. Big game hunting guides and their guiding areas are regulated by the Alaska Guide Licensing and Control Board. In addition, all big game hunting guides, as well as all other recreational guides and outfitters, are required under Title 50, Code of Federal Regulations, Part 27.97 to obtain special use permits to operate on the refuge. These permits are issued annually, and authorize the guides and outfitters to operate in the refuge for an agreed upon time period. The Service will attach conditions to these permits to ensure that the guides' and outfitters' camps, travel methods, and activities are consistent with the selected alternative. Under Title 43, Code of Federal Regulations, Part 2650.1(a) and a December 1981 Service policy directive, guides and outfitters also must have a letter of concurrence from the village corporations to use Native selected lands within the refuge boundary.

Stipulations would be included in the permits issued to both guides and outfitters to help reduce the potential for resource impacts. Arctic Refuge has only a limited number of good access points. Despite the huge size of the refuge, good camping sites tend to be used repeatedly by different parties as well. Consequently, both guided groups and outfitted groups using tents may be limited in how long they can camp at at one location. This action would be taken to minimize potential conflicts with bears, to disperse use and thus reduce other potential resource impacts, or to ensure that other users have an opportunity to use an area. Other stipulations could cover such items as group size, food storage, garbage disposal, and minimum impact camping practices. The need for specific camping time limits and other stipulations will be addressed in the recreation management plan.

In all of the alternatives guides and outfitters would be permitted to use tents on the refuge. New permanent structures, such as cabins, would only be permitted if the conditions of Section 1303 of the Alaska Lands Act are met.

Under all of the alternatives the Service will monitor the number and type of guides and outfitters operating in the refuge and will, if necessary, restrict use. In the future it may become necessary to limit the amount of guided use on the refuge's rivers. These limits would be intended to protect the refuge's resources. Should excessive use of refuge areas require limitations of use, the Service may provide preference to individuals over commercial interests. If problems arise relating to guided or outfitted parties, such as conflicts with subsistence use or violations of conditions in the permits, the Service will work with the operator(s), and other appropriate groups, such as local landowners and the State, to resolve the situation.

If it becomes necessary to limit guiding or outfitting in the refuge the Service reserves the right to revoke the permits it has issued or not reissue the permits after they expire. Permits may be allocated to backpack/river guides and outfitters on the basis of several criteria. These criteria may include: ability of the specific area to sustain the proposed use; history of past use on the refuge and other public lands; financial responsibility (i.e., being able to show the operator has sufficient funds to operate a safe, quality business); knowledge of the area; level of experience; duration of use in the year; and record of compliance with refuge rules and regulations. Other factors that would be considered in regulating use levels in specific areas would include the availability and demand for the resources in the immediate area and availability of comparable services on adjacent private lands. The Service will work with the operators and the State to ensure that the allocation of permits is done fairly and equitably.

It may be necessary in the future to regulate outfitting of big game hunting in more popular hunting areas so as to reduce the potential for overharvest of game animals. One possible course of action would be to allocate areas for outfitting of big game hunting in the refuge, using a method similar to the current registered guide area system used by the State of Alaska. A primary reason for this action will be to reduce the potential for overharvest of game animals in the more popular hunting areas.

(g) Mining Operations

Public Land Order 2214, issued on December 6, 1960, closed the Arctic National Wildlife Range to appropriation under the mining laws. Section 304(c) of the Alaska Lands Act reaffirmed this closure of the original refuge, and closed the new additions to the refuge to prospecting, development, extraction, and removal of locatable hardrock minerals (e.g., gold, silver, uranium, zinc). Panning for gold is permitted as a recreational activity throughout the refuge, in accordance with appropriate regulation.

As of May, 1987, there were six active lode claims, two active placer claims, and one active mill site claim in the Arctic Refuge, all on the south side of the Brooks Range. These are claims that existed prior to the enactment of the Alaska Lands Act, and mining could occur under all of the management categories in all of the management alternatives. The Service would monitor mining operations to ensure compliance with appropriate state and federal laws and regulations.

Coal mining and geothermal leasing are both prohibited by law on refuges: Section 16 of the Federal Coal Leasing Amendment Act of 1975 (PL 94-377) prohibits coal mining on refuges, while Section 1014(c) of the Geothermal Steam Act (30 U.S.C. 1001-1021) prohibits geothermal leasing.

(h) Other Economic Uses

Livestock grazing (except as required for use of pack animals), hydroelectric development, and leasing for minerals (other than oil and gas), would not be permitted under any alternative in this plan due to potential adverse effects on the refuge's fish and wildlife resources, particularly caribou, wolf, brown bear, muskox, arctic char and arctic grayling.

17) Refuge Administration and Facilities

The Service's headquarters and primary administrative facilities for the Arctic Refuge are presently located in the federal building in Fairbanks. The facilities there consist primarily of office and limited storage space. A warehouse and a hangar facility are also leased in Fairbanks. These two facilities are shared with other Fish and Wildlife Service offices.

Other refuge facilities include the Clarence Rhode Field Station and the Angus Gavin bunkhouse, located in the village of Kaktovik, an aviation fuel bulk tank at the BAR Main Distant Early Warning Line Station at Barter Island, an aviation fuel tank at the airstrip at Arctic Village, the Edward A. Holmes Research Station at Peters Lake, and three administrative cabins located at Elusive Lake, Junjik River and Mancha Creek.

The field station at Kaktovik is the refuge's primary field facility. It can and has served as a residence. Constructed in 1980, the facility was permanently occupied from 1981 to 1983. Since that time it has been seasonally and intermittently occupied, with most use occurring in the summer field season.

The Peters Lake research station consists of six buildings. Two of the buildings are scheduled to be removed by the Corps of Engineers. The facility was originally established by the Department of the Navy as a substation of the Naval Arctic Research Laboratory (NARL) in Barrow, Alaska. The station receives sporadic use at present, amounting to an average of less than four weeks a year.

Two of the three administrative cabins are former private cabins that Service personnel began using after they were abandoned. The third one was built by the Alaska State Department of Public Safety, Fish and Wildlife Protection Division. The three cabins are used primarily by Service law enforcement personnel on patrol in the refuge. The cabins at Elusive Lake and Junjik River are serviceable, but the Mancha Creek cabin is in a state of disrepair.

Under all of the management alternatives the facilities needs of the refuge will continually be assessed. A facilities plan will be completed as part of the step-down planning process. This plan will evaluate facility needs of the refuge and propose ways to meet those needs accordingly. Part of this facilities plan will address the need for and compatibility with refuge objectives of all facilities. If facilities are found to be unnecessary to fulfill refuge purposes, then appropriate actions will be taken to remove them and rehabilitate the sites.

The refuge permanent staff presently consists of 16 persons: the refuge manager; a primary assistant refuge manager; an assistant refuge manager/pilot; a pilot; a supervisory wildlife biologist; a fish and wildlife biologist; four wildlife biologists; an administrative officer; a financial assistant; two clerk/typists; a computer technician; and a refuge information technician (local hire). In addition to the permanent staff, an average of 4 to 5 seasonal biological technicians are hired annually to help with the summer field projects. An additional 4 to 5 volunteers also may help with this work.

As called for in Section 1308(a) of the Alaska Lands Act, the Service will, whenever possible, hire local residents who have lived or worked in the Arctic Refuge area, or have special knowledge of the area, for positions on the refuge staff. One such person from Arctic Village is currently on staff as a refuge information technician. The Service will continue efforts to employ a person from Kaktovik in a similar position there. Local residents considered for positions are not subject to formal training provisions, employment preference provisions, or numerical limitations on personnel.

18) Refuge Management Plans

Following adoption of one of the alternatives as a comprehensive conservation plan, detailed refuge management plans will be prepared for the Arctic Refuge. These plans will describe the specific actions that will be taken to implement the general directions outlined in the comprehensive plan. They will form the basis for annual work planning and annual budgeting.

Given the magnitude and urgency of possible oil and gas leasing in the refuge's coastal plain and the possible consequences for numerous fishes, caribou, muskox and snow geese, the Service will focus its primary planning efforts on completing management plans for these species. If oil and gas leasing is allowed within the refuge, these plans will outline specific measures for mitigating the adverse effects of the oil and gas activities.

The public use management plan is another high priority to complete. This management plan will provide specific, detailed guidance for managing public use, addressing such topics as commercial guiding and outfitting, cooperative management agreements with adjacent landowners, and site-specific problems such as litter and trespass. This plan will thus "step down" the broader management directions identified in the comprehensive conservation plan.

Other topics that will eventually be addressed in the refuge management plans include: management of fish, Dall sheep, moose, waterfowl, brown bear, polar bear, wolf, furbearers, and other important species; Firth River-Mancha Creek and Shublik research natural areas; Neruokpuk Lake Public Use Natural Area; water resource management; cultural resources management; wilderness management; refuge facilities; and the environmental education and interpretive program.

The Service will work closely with other federal and state agencies, including the Alaska Department of Fish & Game, the State Historic Preservation Officer, and the Bureau of Land Management, the North Slope Borough, village and regional corporations, and interested members of the public in preparing the Arctic Refuge step-down management plans. In particular, the fish and wildlife management plans will be coordinated with the Alaska Department of Fish and Game, the appropriate fish and game advisory committees and appropriate Canadian government agencies. Public involvement in the management plans will be sought when appropriate, with the Service actively involving affected landowners and resource managers in the development of these plans and holding public meetings and/or hearings when controversial issues or proposals are involved.

DESCRIPTION OF THE ALTERNATIVES

Based on the purposes, resources, issues, and opportunities unique to the Arctic Refuge, seven management alternatives have been formulated to guide management of the refuge. The alternatives are general in nature and provide broad strategies for management of refuge resources and uses. Each of the seven alternatives designates areas within the refuge using the management categories described in the beginning of the chapter. Although the alternatives share common strategies, each alternative has a distinct overall emphasis. Table 19 at the end of this chapter summarizes the seven alternatives and their major differences.

Each alternative includes a map showing the location and size of the management categories in the seven alternatives. The maps are intended to only generally portray the alternatives and do not show all of the patented lands and Native allotments present within the refuge boundary.

It also should be noted here that two of the alternatives, Alternative B and Alternative G, would require congressional action before they could be fully implemented by the Service.

Alternative A (Current Situation & Preferred Alternative)

Alternative A is the Service's preferred alternative for managing the Arctic Refuge. This alternative, the "no action" alternative, would maintain the existing range and intensity of management and recreational and economic uses. It is assumed that existing laws, executive orders, regulations and policies governing Service administration and operation of the National Wildlife Refuge System would remain in effect.

Alternative A would protect and maintain the refuge's fish and wildlife values and natural diversity. Disturbances of fish and wildlife habitats and populations would be minimized. Opportunities for trapping, hunting, fishing, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act.

The following management directions summarize Alternative A. Alternative A would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational activities;
- o permit guides and outfitters to operate in the refuge;
- o permit oil and gas studies where compatible with refuge purposes; and
- o propose no additional areas for wilderness designation.

Figure 35 shows the location of the management categories in Alternative A; Table 12 shows the distribution of refuge lands in each type of management category. Most of the refuge lands outside of the existing Arctic Wilderness (about 56% of the refuge) would be designated for minimal management and receive a high level of protection. The federal lands in the "1002" coastal plain area also would be managed as a minimal management area until Congress takes action on the recommendations in the 1002(h) report. About 2% of the refuge lands would be included in the three wild river corridors in the refuge. No moderate or intensive management areas would be designated and no areas proposed for wilderness in this alternative. (See Table 10 for the fish and wildlife management activities, public uses and economic uses that would be permitted in the minimal and designated wilderness management categories.)

Table 12. Size of management categories in Alternative A.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness Lands
Intensive Management	0	0	--
Moderate Management	0	0	--
Minimal Management ^{b/}	10,790,000	56	--
Wild River Management ^{c/}	401,000	2	--
Designated Wilderness	8,000,000	42	--
<u>Total Federal Lands</u>	<u>19,191,000</u>	<u>100</u>	--
Wilderness Proposal	0	0	--
Native Lands (subject to Section 22(g)) ^{d/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

^{b/} This category includes the 1.5 million acre-"1002" coastal plain area, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

Figure 35. Alternative A.

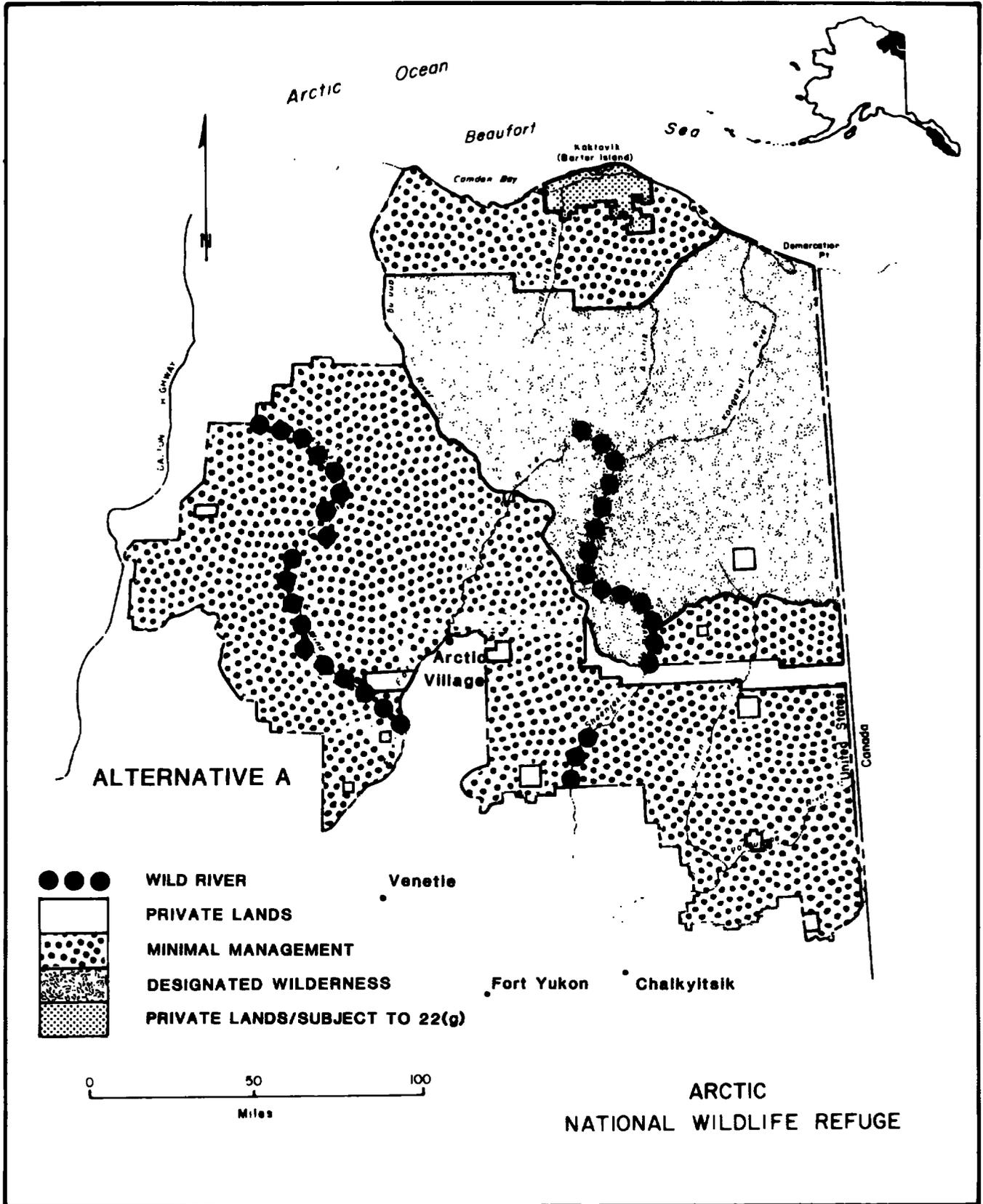


Figure 35 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands in and near the "1002" area. Oil and gas activities on the Native corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to environmental standards established by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

In Alternative A the Service would emphasize protection of existing fish and wildlife populations and habitats. Special attention would be given to protecting existing caribou, muskox, brown and polar bear, peregrine falcon, Dall sheep, moose, arctic char, salmonid and whitefish populations and habitats in the refuge. The Service in cooperation with the Alaska Department of Fish and Game would monitor these populations and work with the local villages and the public to ensure that the populations are maintained. Management of hunting, fishing, and trapping (in cooperation with the Alaska Department of Fish and Game) would be the primary means of maintaining or increasing fish and wildlife populations in the refuge. Habitat improvements generally would not occur. (Refer to the "common management directions" and Table 10 for more details on fish and wildlife management directions.)

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative A. Subsistence use would be managed as described in the "common management directions" and Table 10. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird, and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Public Use and Access Management

The "common management directions" and Table 10 generally describe how public use and access would be managed in Alternative A. The Service would maintain opportunities for hunting, fishing, trapping, and nonconsumptive recreational uses in the refuge.

Access would be managed as prescribed in Sections 1110 and 811 of the Alaska Lands Act and the Service's regulations (Title 43, Code of Federal Regulations, Part 36.11). The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods would continue to be allowed throughout the refuge, subject to reasonable regulations, for traditional activities. The use of off-road vehicles, including air boats, for recreational purposes would be prohibited.

Primitive camping would be allowed on all refuge lands. In the future time limits may be placed on a seasonal or area-specific basis with regard to how long groups would be able to camp at one location. This action would be taken if necessary to minimize the potential for adverse impacts to fish and wildlife.

Oil and Gas Management

The Service would permit oil and gas studies south of the "1002" coastal plain area, where compatible with refuge purposes (see the "common management directions" and Table 10). In the Arctic Wilderness surface motorized equipment generally would not be permitted for oil and gas studies. All oil and gas studies would be subject to reasonable regulations through mitigation and monitoring to minimize impacts to fish and wildlife resources and to subsistence activities.

Under Section 1003 of the Alaska Lands Act production of oil and gas and oil and gas leasing are not permitted in the Arctic Refuge.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Other economic uses, including commercial timber harvesting, sand and gravel removal, and construction of transmission lines/pipelines, would not be permitted on refuge lands (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation).

Wilderness Proposal and Associated Management Actions for Alternative A

In Alternative A no refuge lands would be proposed for wilderness designation.

Wilderness Management Actions - Four significant wilderness designation issues were identified in Chapter II:

- o What effect would wilderness designation have on wilderness values?
- o What effect would wilderness designation have on the exploration and development of oil and gas?
- o What effect would wilderness designation have on the level of mineral development in the refuge?
- o What effect would wilderness designation have on commercial timber harvesting?

Alternative A would not propose any of the refuge for wilderness designation. As a result none of the above issues apply in this alternative. Activities and uses are projected to remain at current levels in the scenario for Alternative A in Chapter VI.

Wilderness values - Under Alternative A the Service would manage all refuge lands outside of the existing Arctic Wilderness in non-wilderness categories (i.e., minimal management, wild river management areas). The management actions under these categories, identified in Table 10, indicate how the Service would protect the refuge's wilderness values.

Oil and gas exploration and development - In Alternative A all of the non-wilderness lands would be designated as minimal or wild river management areas. Oil and gas studies, including seismic surveys, could occur in these areas, as outlined in Table 10 and in the "oil and gas common management direction." The scenario for Alternative A in Chapter VI projects that oil and gas studies would be conducted in the refuge, south of the Brooks Range.

Oil and gas leasing is not permitted in the Arctic Refuge under Section 1003 of the Alaska Lands Act. Although Congress could change this in the future to provide for leasing, the scenario for Alternative A assumes that oil and gas leasing would not occur on refuge lands (excluding the "1002" coastal plain area). (The scenario for Alternative B in the plan assumes Congress would approve oil and gas leasing south of the "1002" area, and addresses a possible development on the south side of the Brooks Range.)

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative A scenario projects the current situation into the future. The scenario thus assumes no mineral development would occur on refuge land in the future. (Scenarios for other alternatives assume mineral development would occur, and project the resulting potential impacts.)

Commercial timber harvesting - No commercial timber harvesting occurs on the refuge today. The minimal management category also would not permit commercial timber harvesting in the refuge. Although this management category could be administratively changed in the future, the Alternative A scenario assumes no commercial timber harvesting would occur on the refuge. (The scenarios for Alternatives B and C assume this use would occur in the future, and project the resulting potential impacts.)

Management Costs

In Fiscal Year 1987 the Arctic Refuge had an operations and maintenance budget of \$1,069,000, with a staff of 16 permanent full-time employees. The refuge also employs a large number of seasonal employees. An additional \$110,000 was spent on fisheries related tasks. A large percentage of the refuge's budget was one-year funds dedicated to work on the "1002" coastal plain. If Alternative A is selected as the comprehensive conservation plan for the Arctic Refuge, it would be necessary to increase the operations and maintenance budget by 80% and add 10 permanent staff to fully implement the "common management directions." Additional funding and staffing would be needed to manage the expected increase in public use, expand the Service's interpretive and environmental education program, increase law enforcement, monitor oil and gas activities on the refuge, monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary, and conduct needed research studies (particularly on the south side of the Brooks Range).^{a/}

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Alternative B

This alternative was developed in response to comments from the Resource Development Council for Alaska during the planning process. Under Alternative B the Service would continue to protect key fish and wildlife populations and habitats, while providing opportunities for commercial timber harvesting on refuge lands south of the Brooks Range. This alternative would also include a recommendation to Congress that all lands in intensive and moderate management be made available for oil and gas leasing. Extensive stipulations and mitigation work would be required to minimize adverse impacts from these economic uses. The use of habitat improvement techniques, including mechanical manipulation, could be permitted in designated areas in this alternative. The Service would manage public use in the refuge as it has in the past, subject to restrictions which would be required for development activities. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service would recommend that no additional refuge lands be proposed for wilderness designation under Alternative B.

Alternative B shares the following management directions with Alternative A (the Current Situation). Alternative B would:

- o maintain the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o permit oil and gas studies where compatible with refuge purposes; and
- o propose no additional areas for wilderness designation.

The following management directions indicate the major differences in Alternative B from Alternative A. Alternative B would:

- o provide opportunities for commercial timber harvesting in designated areas in the refuge;
- o provide opportunities for oil and gas leasing south of the Brooks Range pursuant to Section 1008 of the Alaska Lands Act if Congress repeals Section 1003 of the Alaska Lands Act; and
- o provide opportunities for habitat improvements, including mechanical manipulation, water diversions and impoundments, if necessary in the future.

Figure 36 shows the distribution of the management categories in Alternative B; Table 13 indicates the sizes of the management categories. (See Table 10 for the fish and wildlife management activities, public uses and economic uses that would be permitted in these management categories.) Two intensive management areas, accounting for 11% of the refuge lands would be designated in this alternative, one area extending from just north of Arctic Village to the Wind River, and the other area extending southeast of the Sheenjek River to the refuge/Canadian boundary. Most of the remaining refuge lands south of the Brooks Range, accounting for 15% of the refuge, would be designated as moderate management areas. The Brooks Range west of the existing Arctic Wilderness, accounting for 22% of the refuge, would be designated as a minimal management area. The federal lands in the "1002" coastal plain area would be managed as a minimal management area until Congress takes action on the recommendations in the 1002(h) report.

Figure 36. Alternative B.

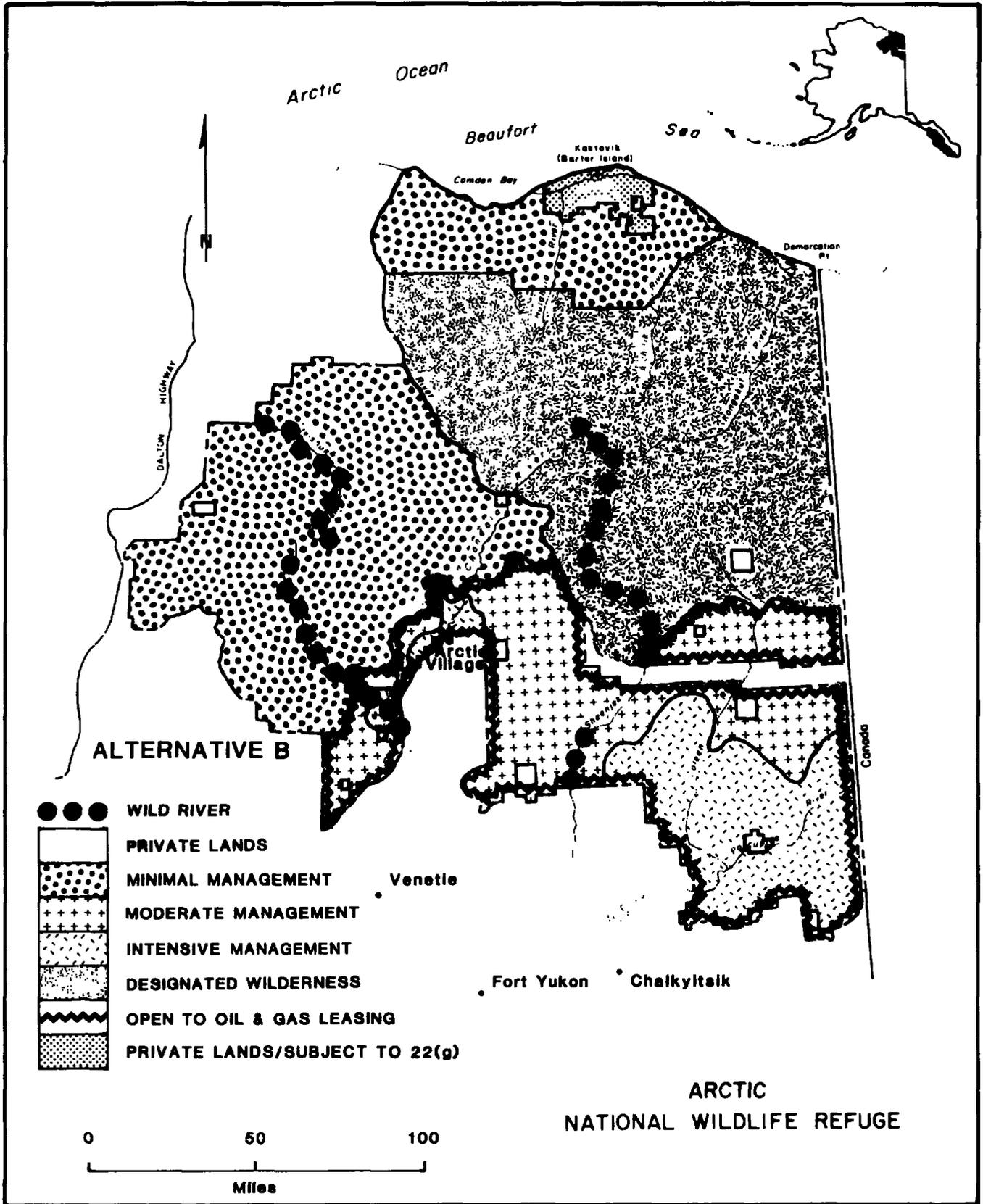


Table 13. Size of management categories in Alternative B.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness Lands
Intensive Management	2,077,000	11	--
Moderate Management	2,922,000	15	--
Minimal Management ^{b/}	5,791,000	30	--
Wild River Management ^{c/}	401,000	2	--
Designated Wilderness	8,000,000	42	--
<u>Total Federal Lands</u>	<u>19,191,000</u>	<u>100</u>	<u>--</u>
Wilderness Proposal	0	0	--
Native Lands (subject to Section 22(g)) ^{d/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

^{b/} This category includes the 1.5 million acre-"1002" coastal plain area, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

Figure 36 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the 22(g) lands. Oil and gas activities on the the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to environmental standards established by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

In Alternative B the Service would continue to protect fish and wildlife populations and habitats. Special attention would be given to protecting existing caribou, muskox, polar bear, peregrine falcon, Dall sheep, moose, arctic char, salmonid and whitefish populations and habitats in the refuge. The Service in cooperation with the Alaska Department of Fish and Game would monitor these populations and work with the local villages and the public to ensure that the populations are maintained. Management of hunting, fishing, and trapping (in cooperation with the Alaska Department of Fish and Game) would be the primary means of maintaining or increasing fish and wildlife populations in the refuge. Habitat improvements, including mechanical manipulation, water diversions and impoundments, could be permitted in designated areas in the refuge. (Refer to the "common management directions" and Table 10 for more details on fish and wildlife management directions.)

Alternative B would require the Service to devote special attention to minimizing impacts caused by economic developments. The Service would carefully manage economic development activities to minimize conflicts with refuge fish and wildlife populations. Water quality and quantity and other habitat conditions would be carefully monitored. Environmental stipulations and mitigation measures would be included in all of the permits to minimize potential impacts. Habitat restoration would be required when the economic development is completed.

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative B. Subsistence use would be managed as described in the "common management directions" and Table 10. In this alternative more Service resources would have to be devoted to developing stipulations and monitoring oil and gas activities, other economic uses, and public use to ensure that subsistence opportunities are maintained. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Public Use and Access Management

The "common management directions" and Table 9 generally describe how public use and access would be managed in Alternative B. Access would be managed as prescribed in Sections 1110 and 811 of the Alaska Lands Act and the Service's regulations (Title 43, Code of Federal Regulations, Part 36.11). The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods would continue to be allowed throughout the refuge, subject to reasonable regulations, for traditional activities. The use of off-road vehicles, including air boats, for recreational purposes would be prohibited. In Alternative B haul roads or airstrips could be built to improve access for development purposes in the intensive and moderate management areas, but these facilities would not be open to public use.

The Service would continue to manage public use in this alternative as it has in the past, subject to restrictions which would be required for development activities. Primitive camping generally would be permitted throughout the refuge. In the future time limits may be placed on a seasonal or area-specific basis with regard to how long groups would be able to camp at one location. This action would be taken if necessary to minimize the potential for adverse impacts to fish and wildlife.

Oil and Gas Management

Areas adjacent to the Arctic Refuge, in the Yukon Flats Refuge and parts of the Venetie-Arctic Village lands, have been identified by the Bureau of Land Management to have moderate oil and gas potential (Banet, 1987). It is assumed that this potential extends into the moderate and intensive management areas in the Arctic Refuge.

The Service would permit oil and gas studies south of the "1002" coastal plain, where compatible with refuge purposes (see the "common management directions" and Table 10). In the Arctic Wilderness surface motorized equipment generally would not be permitted for oil and gas studies. All oil and gas studies would be subject to reasonable regulations through mitigation and monitoring to minimize impacts to fish and wildlife resources and to subsistence activities.

Under Section 1003 of the Alaska Lands Act oil and gas production and oil and gas leasing are not permitted on the Arctic Refuge. In this alternative, however, the Service would recommend that Congress permit oil and gas leasing in the intensive and moderate management areas. If Alternative B is selected and Congress approves leasing, the Service would prepare an oil and gas management plan for the refuge. This plan would evaluate refuge resources on a site-specific basis, and identify under what conditions oil and gas leasing could take place. The plan would provide the basis for developing stipulations that would be attached to the leases to minimize potential impacts to the refuge's resources and users. After the oil and gas plan is approved, the Bureau of Land Management would issue leases for the refuge. Additional environmental assessments would be completed on a site-specific basis by the Service as oil and gas development proceeds to ensure that adverse impacts are minimized.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Other economic uses, including commercial timber harvesting, sand and gravel removal, and construction of transmission lines/pipelines, may be permitted in the two intensive management areas if compatible with refuge purposes (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation). Timber harvesting also could be permitted in the moderate management area. Special use permits would be required, under Title 50, Code of Federal Regulations, Part 27.97, to authorize timber harvesting and sand and gravel removal. Conditions would be attached to these permits to ensure that the activities are consistent with the selected alternative and refuge purposes. The Service would monitor these

activities to ensure that impacts to refuge resources and subsistence uses are minimized.

Wilderness Proposal and Associated Management Actions for Alternative B

In Alternative B no refuge lands would be proposed for wilderness designation.

Wilderness Management Actions - Because no additional lands would be proposed for wilderness designation in this alternative, none of the significant wilderness designation issues identified in Chapter II apply in this alternative. Management actions that would affect wilderness values or the significant wilderness issues are referenced below.

Wilderness values - Under Alternative B the Service would manage all refuge lands outside of the existing Arctic Wilderness in non-wilderness categories (i.e., intensive, moderate, minimal, and wild river management areas). Wilderness values in the existing Arctic Wilderness would be protected, but may be impacted by activity in the intensive management areas. The management actions under the non-wilderness management categories, identified in Table 10, indicate how the Service would protect the refuge's other wilderness values.

Oil and gas exploration and development - In Alternative B oil and gas studies, including seismic surveys, could occur on all of the non-wilderness refuge lands (south of the "1002" area), as outlined in Table 10, and in the "oil and gas common management direction." Limited oil and gas studies could be permitted in the Arctic Wilderness. The scenario for Alternative B in Chapter VI projects that oil and gas studies, including seismic surveys, would be conducted in the refuge, south of the Brooks Range.

Although oil and gas leasing is not permitted in the Arctic Refuge under Section 1003 of the Alaska Lands Act, under Alternative B the Service would recommend Congress open the intensive and moderate management areas south of the Brooks Range to leasing. The scenario for Alternative B assumes Congress approves oil and gas leasing south of the "1002" area and the Arctic Wilderness, and outlines a possible development on the south side of the Brooks Range, near the Porcupine River. The effects of this management action are used in comparing the effects of wilderness designation in other alternatives.

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative B scenario assumes that one placer mine near the Christian River would be developed in the future. As noted in the "common management directions," the Service would closely monitor the mining activity to ensure impacts to refuge resources are minimized.

Commercial timber harvesting - No commercial timber harvesting occurs on the refuge. In Alternative B timber harvesting could occur in the intensive and moderate management areas in the future. The scenario for Alternative B assumes a small commercial operation would occur on the Porcupine River. The Service would attach stipulations to the special use permit and closely monitor the operation to ensure that potential impacts to refuge resources are minimized.

Management Costs

Assuming that all the commercial uses described above occur, if Alternative B is selected as the comprehensive conservation plan for the Arctic Refuge, the Service would need 12 more permanent staff and a 94% increase in funding over the current annual operations and maintenance budget (\$1.1 million in Fiscal Year 1987)--the largest increase in management funding of the seven alternatives considered. Increased funding and staffing would be needed to monitor the oil and gas, commercial timber harvest, and mining operations, address mitigation concerns, increase law enforcement, manage the expected increase in public use, expand the Service's interpretive and environmental education program, monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary, and conduct needed research studies (particularly on the south side of the Brooks Range).^{a/}

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Alternative C

Alternative C was developed in response to comments from the Resource Development Council for Alaska during the planning process. In Alternative C the Service would continue to protect key fish and wildlife populations and habitats while providing opportunities for commercial timber harvesting on refuge lands on the Porcupine Plateau. Alternative C differs from Alternative B in that all lands in the moderate management category would remain closed to oil and gas leasing. This alternative also would keep open options for habitat management--habitat improvement techniques, including mechanical manipulation, could be permitted in designated areas. The Service would manage public use in the refuge as it has in the past. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service would recommend that no additional refuge lands be proposed for wilderness designation under Alternative C.

Alternative C shares the following management directions with Alternative A (the Current Situation). Alternative C would:

- o maintain the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o permit oil and gas studies where compatible with refuge purposes; and
- o propose no additional areas for wilderness designation.

The major differences in management directions between Alternative C and Alternative A are that Alternative C would:

- o provide opportunities for commercial timber harvesting in designated areas in the refuge; and
- o provide opportunities for habitat improvements, including mechanical manipulation, water diversions and impoundments, if necessary in the future.

Figure 37 shows the distribution of the management categories in Alternative C; Table 14 indicates the sizes of the management categories. (See Table 10 for the fish and wildlife management activities, public uses and economic uses that would be permitted in these management categories.) A moderate management area, accounting for 26% of the refuge lands, would cover the foothills and lower river valleys south of the Brooks Range. The Brooks Range west of the existing Arctic Wilderness, accounting for 22% of the refuge lands, would be designated as a minimal management area. The federal lands in the "1002" coastal plain area also would be included as a minimal management area, pending congressional action on the recommendations in the 1002(h) report. No intensive management areas would be designated in this alternative, nor would any areas be proposed for wilderness designation.

Figure 37 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the 22(g) lands. Oil and gas activities on the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to

Figure 37. Alternative C.

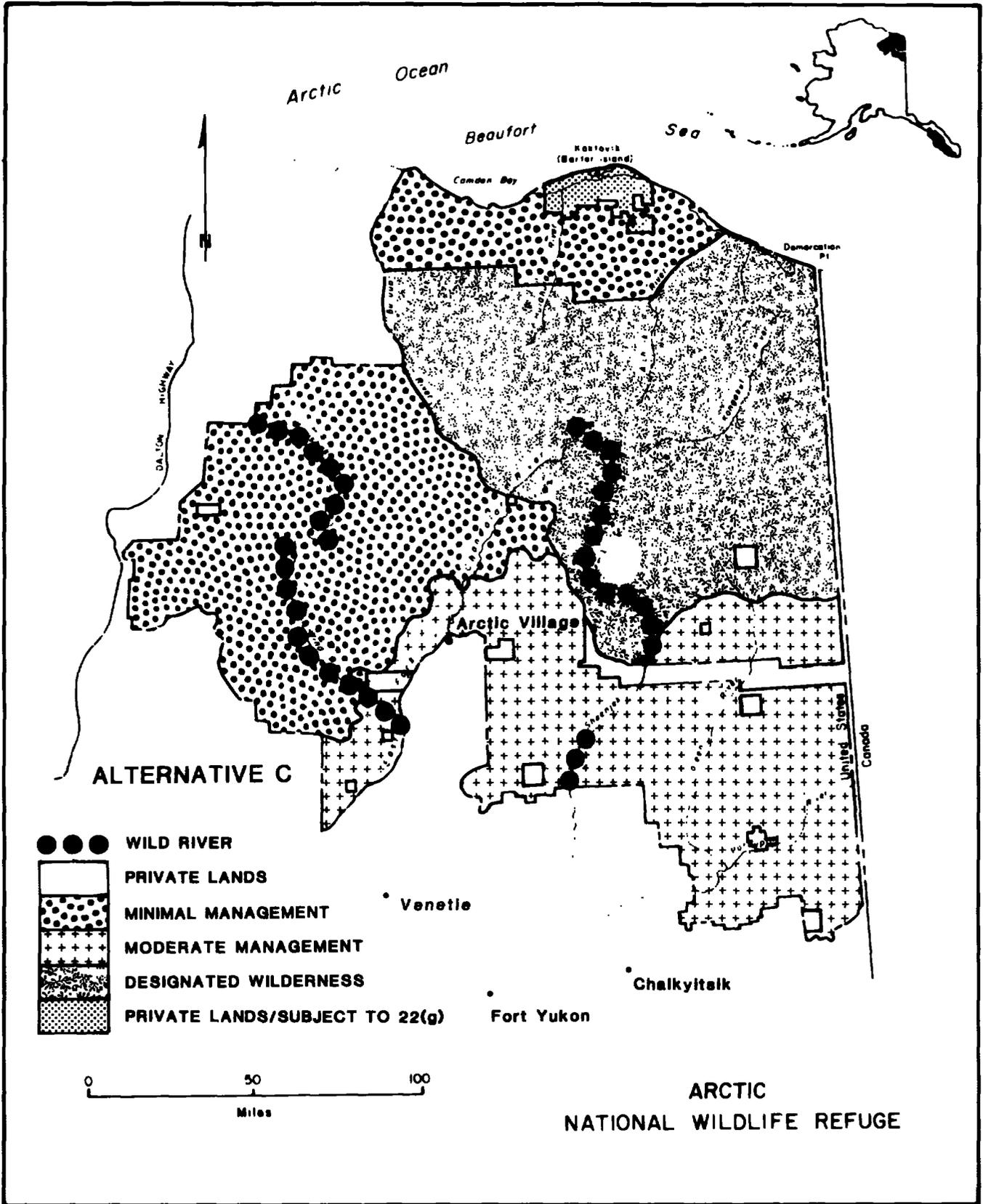


Table 14. Size of management categories in Alternative C.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness Lands
Intensive Management	0	0	--
Moderate Management	4,999,000	26	--
Minimal Management ^{b/}	5,791,000	30	--
Wild River Management ^{c/}	401,000	2	--
Designated Wilderness	8,000,000	42	--
<u>Total Federal Lands</u>	<u>19,191,000</u>	<u>100</u>	<u>--</u>
Wilderness Proposal	0	0	--
Native Lands (subject to Section 22(g)) ^{d/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

^{b/} This category includes the 1.5 million acre-"1002" coastal plain area, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

environmental standards established by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

In Alternative C the Service would continue to protect fish and wildlife populations and habitats. Special attention would be given to protecting existing caribou, muskox, polar bear, peregrine falcon, Dall sheep, moose, arctic char, salmonid and whitefish populations and habitats in the refuge. The Service in cooperation with the Alaska Department of Fish and Game would monitor these populations and work with the local villages and the public to ensure that the populations are maintained. Management of hunting, fishing,

and trapping (in cooperation with the Alaska Department of Fish and Game) would be the primary means of maintaining or increasing fish and wildlife populations in the refuge. Habitat improvements, including mechanical manipulation, water diversions and impoundments, could be permitted in designated areas in the refuge. (Refer to the "common management directions" and Table 10 for more details on fish and wildlife management directions.)

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative C. Subsistence use would be managed as described in the "common management directions" and Table 10. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Public Use and Access Management

The "common management directions" and Table 9 generally describe how public use and access would be managed in Alternative C. Access would be managed as prescribed in Sections 1110 and 811 of the Alaska Lands Act and the Service's regulations (Title 43, Code of Federal Regulations, Part 36.11). The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods would continue to be allowed throughout the refuge, subject to reasonable regulations, for traditional activities. The use of off-road vehicles, including air boats, for recreational purposes would be prohibited.

The Service would continue to manage public use in this alternative as it has in the past. Primitive camping generally would be permitted throughout the refuge. In the future time limits may be placed on a seasonal or area-specific basis with regard to how long groups would be able to camp at one location. This action would be taken to minimize the potential for adverse impacts to fish and wildlife.

Oil and Gas Management

The Service would permit oil and gas studies south of the "1002" coastal plain area, where compatible with refuge purposes (see the "common management directions" and Table 10). In the Arctic Wilderness motorized surface equipment generally would not be permitted for oil and gas studies. All oil and gas studies would be subject to reasonable regulations through mitigation and monitoring to minimize impacts to fish and wildlife resources and to subsistence activities.

Under Section 1003 of the Alaska Lands Act oil and gas production and oil and gas leasing are not permitted in the Arctic Refuge.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Commercial timber harvesting may be permitted in the moderate management area if compatible with refuge purposes. Special use permits would be required, under Title 50, Code of Federal Regulations, Part 27.97, to authorize timber harvesting. Conditions would be attached to these permits to ensure that the activities are consistent with the selected alternative and refuge purposes. The Service would monitor any timber harvesting operations to ensure that impacts to refuge resources and subsistence uses are minimized. Other economic uses, including sand and gravel removal and construction of transmission lines/pipelines, would not be permitted on refuge lands (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation).

Wilderness Proposal and Associated Management Actions for Alternative C

In Alternative C no refuge lands would be proposed for wilderness designation.

Wilderness Management Actions - Because no additional lands would be proposed for wilderness designation in this alternative, none of the significant wilderness designation issues identified in Chapter II apply in this alternative. Management actions that would affect wilderness values or the significant wilderness issues are referenced below.

Wilderness values - Under Alternative C the Service would manage all refuge lands outside of the existing Arctic Wilderness in non-wilderness categories (i.e., moderate, minimal, and wild river management areas). Wilderness values in the existing Arctic Wilderness would be protected, but may be impacted by activity in the moderate management areas. The management actions under the non-wilderness management categories, identified in Table 10, indicate how the Service would protect the refuge's other wilderness values.

Oil and gas exploration and development - In Alternative C oil and gas studies, including seismic surveys, could occur on all of the non-wilderness refuge lands (south of the "1002" area), as outlined in Table 10 and in the "oil and gas common management direction." Limited oil and gas studies could be permitted in the Arctic Wilderness. The scenario for Alternative C in Chapter VI projects that oil and gas studies would be conducted in the refuge south of the Brooks Range.

Oil and gas leasing is not permitted in the Arctic Refuge under Section 1003 of the Alaska Lands Act. Although Congress could change this in the future to provide for leasing, the scenario for Alternative C assumes that oil and gas leasing would not occur on refuge lands (excluding the "1002" coastal plain area).

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative C scenario assumes that one placer mine near the Christian River would be developed in the future. As noted in the "common management directions," the Service would closely monitor the mining operation to ensure impacts to refuge resources are minimized.

Commercial timber harvesting - No commercial timber harvesting occurs on the refuge. In Alternative C timber harvesting could occur in the moderate management areas in the future. The scenario for Alternative C assumes a small commercial operation would occur on the Porcupine River. The Service would attach stipulations to the special use permit and closely monitor the operation to ensure that potential impacts to refuge resources are minimized.

Management Costs

To implement Alternative C, the Service would need 11 more permanent staff and an 87% increase in funding over the current annual operations and maintenance budget (\$1.1 million in Fiscal Year 1987). Increased funding and staffing would be needed to monitor commercial uses such as timber harvest activities, increase law enforcement, manage the expected increase in public use, expand the Service's interpretive and environmental education program, monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary, and conduct needed research studies (particularly on the south side of the Brooks Range).^{a/}

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Alternative D

Alternative D emphasizes protection of fish and wildlife populations and habitats. Disturbances to fish and wildlife habitats and populations would be minimized. Opportunities for hunting, fishing, trapping, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. Guiding and outfitting would be the primary permitted commercial use of the refuge south of the Brooks Range. The Service would manage public use on the refuge as it has in the past. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service would also recommend additional refuge lands be proposed for wilderness designation in this alternative.

Alternative D shares the following management directions with Alternative A (the Current Situation). Alternative D would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational activities;
- o permit guides and outfitters to operate in the refuge; and
- o permit oil and gas studies where compatible with refuge purposes.

The major difference between Alternative D and Alternative A is that Alternative D would:

- o propose most of the refuge lands in the Brooks Range west of the Canning River and the East Fork of the Chandalar River for wilderness designation.

Figure 38 shows the distribution of the management categories in Alternative D; Table 15 indicates the sizes of the management categories. (See Table 10 for the fish and wildlife management activities, public uses and economic uses that would be permitted in these management categories.) All of the refuge lands south and west of the existing Arctic Wilderness boundary, accounting for 50% of the refuge, would be designated either as minimal or wild river management areas. The federal lands in the "1002" coastal plain area also would be managed as a minimal management area, pending congressional action on the recommendations in the 1002(h) report. Most of the refuge lands in the Brooks Range outside of the existing Arctic Wilderness, accounting for about 46% of the non-wilderness refuge lands, would be proposed for wilderness designation in Alternative D (with the exceptions of lands along the lower Wind River, the Junjik River and along the East Fork of the Chandler River north to Red Sheep Creek).

Figure 38 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the 22(g) lands. Oil and gas activities on the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to environmental standards established by Congress for the "1002" coastal plain

Figure 38. Alternative D.

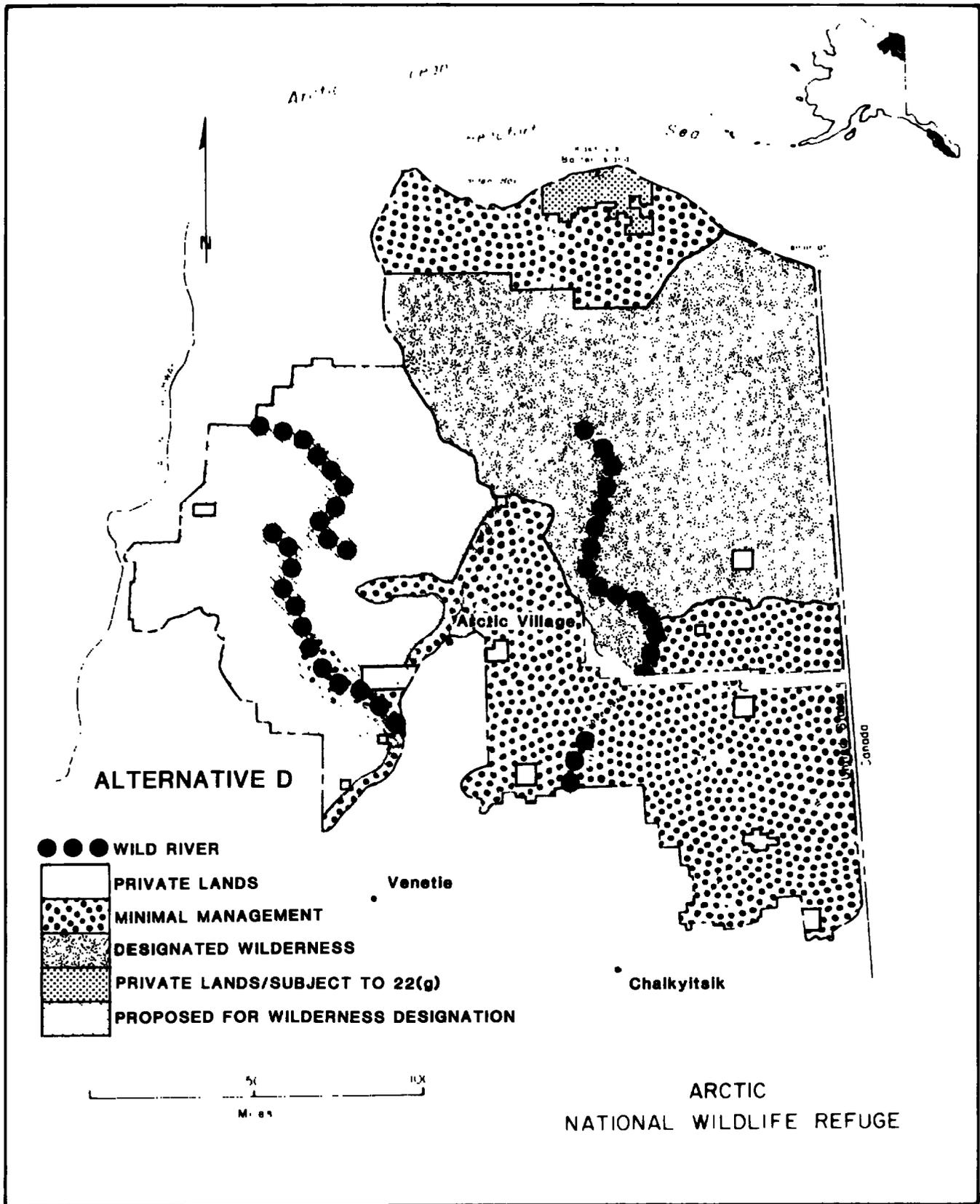


Table 15. Size of management categories in Alternative D.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness Lands
Intensive Management	0	0	--
Moderate Management	0	0	--
Minimal Management ^{b/}	10,790,000	56	--
Wild River Management ^{c/}	401,000	2	--
Designated Wilderness	8,000,000	42	--
Total Federal Lands	19,191,000	100	--
Wilderness Proposal ^{d/}	5,200,000	27	46
Native Lands (subject to Section 22(g)) ^{e/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

^{b/} This category includes the 1.5 million acre-"1002" coastal plain area, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} All areas in the wilderness proposal would be managed as minimal management areas or wild river management areas (the proposal includes about 316,000 acres in the Ivishak and Wind wild river corridors) until the areas are designated by Congress.

^{e/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

In Alternative D the Service would emphasize protection of existing fish and wildlife populations and habitats. Special attention would be given to protecting existing caribou, muskox, polar bear, peregrine falcon, Dall sheep,

moose, arctic char, salmonid and whitefish populations and habitats in the refuge. The Service in cooperation with the Alaska Department of Fish and Game would monitor these populations and work with the local villages and the public to ensure that the populations are maintained. Management of hunting, fishing, and trapping (in cooperation with the Alaska Department of Fish and Game) would be the primary means of maintaining or increasing fish and wildlife populations in the refuge. Habitat improvements generally would not occur. (Refer to the "common management directions" and Table 10 for more detail on fish and wildlife management directions.)

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative D. Subsistence use would be managed as described in the "common management directions" and Table 10. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Public Use and Access Management

The "common management directions" and Table 10 generally describe how public use and access would be managed in Alternative D. The Service would maintain opportunities for hunting, fishing, trapping, and nonconsumptive recreational uses in the refuge.

Access would be managed as prescribed in Sections 1110 and 811 of the Alaska Lands Act and the Service's regulations (Title 43, Code of Federal Regulations, Part 36.11). The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods would continue to be allowed throughout the refuge, subject to reasonable regulations, for traditional activities. The use of off-road vehicles, including air boats, for recreational purposes would be prohibited.

The Service would generally manage public use under this alternative as it has done in the past. Primitive camping would be allowed on all refuge lands. The Service would not provide new public use facilities to increase access opportunities in this alternative. In the future time limits may have to be placed on a seasonal or area-specific basis with regard to how long groups would be able to camp at one location. This action would be taken to minimize the potential for adverse impacts to fish and wildlife.

Oil and Gas Management

The Service would permit oil and gas studies south of the "1002" coastal plain area, where compatible with refuge purposes, as noted in the "common management directions" and Table 10. In the Arctic Wilderness motorized surface equipment generally would not be permitted for oil and gas studies. All oil and gas studies would be subject to reasonable regulations through mitigation and monitoring to minimize impacts to fish and wildlife resources and to subsistence activities.

Under Section 1003 of the Alaska Lands Act oil and gas production and oil and gas leasing are not permitted in the Arctic Refuge.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Other economic uses, including commercial timber harvesting, sand and gravel removal, and construction of transmission lines/pipelines, would not be permitted on refuge lands (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation).

Wilderness Proposal and Associated Management Actions for Alternative D

In Alternative D the Service would propose most of the non-wilderness refuge lands in the Brooks Range be designated as wilderness--approximately 5.2 million acres (2.1 million ha) west of the Canning River and the East Fork of the Chandalar River, or 46% of the non-wilderness lands in the refuge, would be added to the existing Arctic Wilderness. As noted in the "Wilderness Review" in Chapter IV, the Brooks Range is suitable for wilderness designation. The Service would continue to maintain the high resource values of the proposed area through minimal management if it is not congressionally designated as wilderness.

Wilderness Management Actions - If Congress designates the proposed area as wilderness, the Service would manage the area in the same way as it manages the existing wilderness area (see the management category description and Table 10 in the beginning of this chapter). Access for traditional activities, including subsistence use, trapping, and recreational hunting and fishing, would continue to be permitted in accordance with Titles VIII and XI of the Alaska Lands Act. New permanent structures would only be permitted for administrative and public safety purposes under the provisions of Sections 1303 and 1315 of the Alaska Lands Act.

Management actions that would affect wilderness values or the significant wilderness issues are referenced below.

Wilderness values - The Service would protect the wilderness values in the proposed addition in the same way that it protects the existing Arctic Wilderness. Other refuge lands would be managed under a non-wilderness category (i.e., minimal or wild river management). No special actions would be taken to protect wilderness values other than those noted in the description of the management categories and in Table 10.

Oil and gas exploration and development - The Service would apply the same management directions to the new wilderness area as it does to the existing wilderness area (see Table 10 and the "oil and gas common management direction"). Only limited oil and gas studies would be permitted in the new wilderness area. The scenario for Alternative D in Chapter VI assumes that surface geologic studies would occur south of the Brooks Range, but not in the proposed wilderness area.

Oil and gas leasing is not permitted in the Arctic Refuge under Section 1003 of the Alaska Lands Act. Oil and gas leasing also would not be permitted in a wilderness area. The scenario for Alternative D thus assumes that oil and gas leasing would not occur on refuge lands (excluding the "1002" coastal plain area).

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative D scenario assumes that one placer mine near the Christian River, in the proposed wilderness area, would be developed in the future. As noted in the "common management directions," the Service would closely monitor the mining operation to ensure impacts to refuge resources are minimized.

Commercial timber harvesting - Under this alternative no opportunities would be provided for commercial timber harvesting--with all of the refuge proposed either for minimal management or wilderness designation, commercial timber harvesting would not be permitted. The scenario for Alternative D thus does not include the a timber harvest operation in the Porcupine River area.

Management Costs

To implement Alternative D, the Service would need 10 more permanent staff and an 80% increase in funding over the current annual operations and maintenance budget (\$1.1 million in Fiscal Year 1987). Additional funding and staffing would be needed to manage the expected increase in public use, expand the Service's interpretive and environmental education program, increase law enforcement, monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary, and conduct needed research studies (particularly on the south side of the Brooks Range).^{a/}

^{a/} The estimates do not include the cost of managing the "1002" area if oil development occurs.

Alternative E

Alternative E is identical to Alternative D except for the size of the wilderness proposal. The alternative emphasizes protection of fish and wildlife populations and habitats. Disturbances to fish and wildlife habitats and populations would be minimized. Opportunities for hunting, fishing, trapping, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. Guiding and outfitting would be the primary permitted commercial use of the refuge south of the Brooks Range. The Service would manage public use on the refuge as it has in the past. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service also would recommend most of the non-wilderness refuge lands (south of the "1002" coastal plain area) be proposed for wilderness designation in Alternative E.

Alternative E shares the following management directions with Alternative A (the Current Situation). Alternative E would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational activities;
- o permit guides and outfitters to operate in the refuge; and
- o permit oil and gas studies where compatible with refuge purposes.

The major difference between Alternative E and Alternative A is that Alternative E would:

- o propose most of the refuge lands in the Brooks Range west of the Canning River and the East Fork of the Chandalar River, and the refuge lands between the existing Arctic Wilderness boundary and the Porcupine River for wilderness designation.

Figure 39 shows the distribution of the management categories in Alternative E; Table 16 indicates the sizes of the management categories. (See Table 10 for the fish and wildlife management activities, public uses and economic uses that would be permitted in these management categories.) All of the refuge lands south and west of the existing Arctic Wilderness boundary, accounting for 50% of the refuge, would be designated either as minimal or wild river management areas. The federal lands in the "1002" coastal plain area also would be managed as a minimal management area, pending congressional action on the recommendations in the 1002(h) report. About 72% of the non-wilderness refuge lands would be proposed for wilderness designation in Alternative E, including most of the Brooks Range mountains and most of the refuge lands in the Porcupine Plateau extending from the East Fork of the Chandalar River to the Canadian border and from the existing Arctic Wilderness boundary to the Porcupine River (with the exceptions of lands around Old John Lake, and lands along the lower Wind River, the Junjik River and the East Fork of the Chandler River north to Red Sheep Creek).

Figure 39. Alternative E.

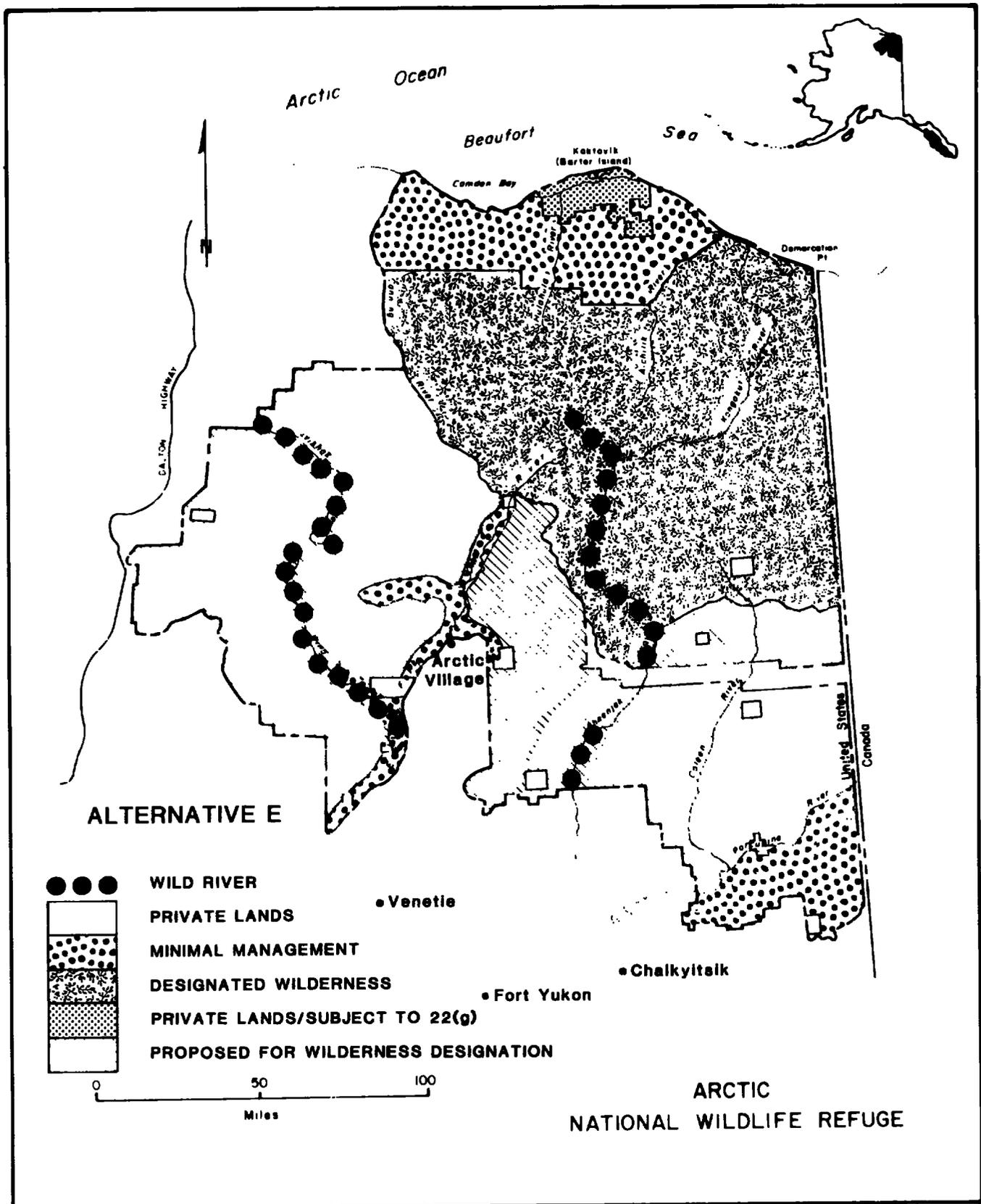


Table 16. Size of management categories in Alternative E.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness Lands
Intensive Management	0	0	--
Moderate Management	0	0	--
Minimal Management ^{b/}	10,790,000	56	--
Wild River Management ^{c/}	401,000	2	--
Designated Wilderness	8,000,000	42	--
<u>Total Federal Lands</u>	<u>19,191,000</u>	<u>100</u>	--
Wilderness Proposal ^{d/}	8,100,000	42	72
Native Lands (subject to Section 22(g)) ^{e/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

^{b/} This category includes the 1.5 million acre-"1002" coastal plain area, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} All areas in the wilderness proposal would be managed as minimal management areas or wild river management areas (the proposal includes about 346,000 acres in the Ivishak, Sheenjek, and Wind wild river corridors) until the areas are designated by Congress.

^{e/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

Figure 39 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the 22(g) lands. Oil and gas activities on the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to environmental standards established by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

In Alternative E the Service would emphasize protection of existing fish and wildlife populations and habitats. Special attention would be given to protecting existing caribou, muskox, polar bear, peregrine falcon, Dall sheep, moose, arctic char, salmonid and whitefish populations and habitats in the refuge. The Service in cooperation with the Alaska Department of Fish and Game would monitor these populations and work with the local villages and the public to ensure that the populations are maintained. Management of hunting, fishing, and trapping (in cooperation with the Alaska Department of Fish and Game) would be the primary means of maintaining or increasing fish and wildlife populations in the refuge. Habitat improvements generally would not occur. (Refer to the "common management directions" and Table 10 for more detail on fish and wildlife management directions.)

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative E. Subsistence use would be managed as described in the "common management directions" and Table 10. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Public Use and Access Management

The "common management directions" and Table 10 generally describe how public use and access would be managed in Alternative E. The Service would maintain opportunities for hunting, fishing, trapping, and nonconsumptive recreational uses in the refuge.

Access would be managed as prescribed in Sections 1110 and 811 of the Alaska Lands Act and the Service's regulations (Title 43, Code of Federal Regulations, Part 36.11). The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods would continue to be allowed throughout the refuge, subject to reasonable regulations, for traditional activities. The use of off-road vehicles, including air boats, for recreational purposes would be prohibited.

The Service would continue to manage public use in Alternative E as it has in the past. Primitive camping would be allowed on all refuge lands. The Service would not provide new public use facilities to increase access opportunities in this alternative. In the future time limits may be placed on a seasonal or area-specific basis with regard to how long groups would be able to camp at one location. This action would be taken to minimize the potential for adverse impacts to fish and wildlife.

Oil and Gas Management

The Service would permit oil and gas studies south of the "1002" coastal plain area, where compatible with refuge purposes, as noted in the "common management directions" and Table 10. In the Arctic Wilderness motorized surface equipment generally would not be permitted for oil and gas studies. All oil and gas studies would be subject to reasonable regulations through mitigation and monitoring to minimize impacts to fish and wildlife resources and to subsistence activities.

Under Section 1003 of the Alaska Lands Act oil and gas production and oil and gas leasing are not permitted in the Arctic Refuge.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Other economic uses, including commercial timber harvesting, sand and gravel removal, and construction of transmission lines/pipelines, would not be permitted on refuge lands (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation).

Wilderness Proposal and Associated Management Actions for Alternative E

In Alternative E the Service would propose most of the non-wilderness refuge lands in the Brooks Range and a large part of the boreal forest on the Porcupine Plateau be placed in wilderness--approximately 5.2 million acres (2.1 million ha) west of the Canning River and the East Fork of the Chandalar River and 2.9 million acres (1.2 million ha) lying between the existing Arctic Wilderness boundary and the Porcupine River would be included in the proposal. Overall, 72% of the non-wilderness lands in the refuge would be added to the existing Arctic Wilderness. As noted in the wilderness review in Chapter V, the Brooks Range and the Porcupine Plateau are suitable for wilderness designation. The Brooks Range wilderness review unit also meets the Service's criteria for wilderness designation. The proposed wilderness area in the Porcupine Plateau would make an easily identifiable and manageable wilderness area. The Service would continue to maintain the high resource values of the proposed wilderness area through minimal management if it is not congressionally designated as wilderness.

Wilderness Management Actions - If Congress designates the proposed area as wilderness, the Service would manage the area in the same way as it manages the existing wilderness area (see the management category description and Table 10 in the beginning of this chapter). Access for traditional activities, including subsistence use, trapping, and recreational hunting and fishing, would continue to be permitted in accordance with Titles VIII and XI of the Alaska Lands Act. New permanent structures would only be permitted for administrative and public safety purposes under the provisions of Sections 1303 and 1315 of the Alaska Lands Act.

Management actions that would affect wilderness values or the significant wilderness issues are referenced below.

Wilderness values - The Service would protect the wilderness values in the proposed addition in the same way that it protects the existing Arctic Wilderness. Other refuge lands would be managed under non-wilderness categories (i.e., minimal, wild river management). No special actions would be taken to protect wilderness values other than those noted in the description of the management categories and in Table 10.

Oil and gas exploration and development - The Service would apply the same management directions to the new wilderness area as it does to the existing wilderness area (see Table 10 and the "oil and gas common management direction"). Limited oil and gas studies would be permitted in the new wilderness area. The scenario for Alternative E in Chapter VI assumes that only surface geologic studies would occur south of the Brooks Range, in the proposed wilderness area.

Oil and gas leasing is not permitted in the Arctic Refuge under Section 1003 of the Alaska Lands Act. Oil and gas leasing also would not be permitted in a wilderness area. The scenario for Alternative E thus assumes that oil and gas leasing would not occur on refuge lands (excluding the "1002" coastal plain area).

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative E scenario assumes that one mine near the Christian River, in the proposed wilderness area, would be developed in the future. As noted in the "common management directions," the Service would closely monitor the mining operation to ensure impacts to refuge resources are minimized.

Commercial timber harvesting - Under this alternative no opportunities would be provided for commercial timber harvesting--with all of the refuge proposed either for minimal management or wilderness designation, commercial timber harvesting would not be permitted. The scenario for Alternative E thus does not include the a timber harvest operation in the Porcupine River area.

Management Costs

To implement Alternative E, the Service would need 9 more permanent staff and a 74% increase in funding over the current annual operations and maintenance budget (\$1.1 million in Fiscal Year 1987). Additional funding and staffing would be needed to manage the expected increase in public use, expand the Service's interpretive and environmental education program, increase law enforcement, monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary, and conduct needed research studies (particularly on the south side of the Brooks Range).^{a/}

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Alternative F

Alternative F is identical to Alternatives D and E except for the increased size of the wilderness proposal. Alternative F emphasizes protection of fish and wildlife populations and habitats. Disturbances to fish and wildlife habitats and populations would be minimized. Opportunities for hunting, fishing, trapping, and other public uses would be maintained, as would scientific research and wildlife observation opportunities. Guiding and outfitting would be the primary permitted commercial use of the refuge south of the Brooks Range. The existing Arctic Wilderness would continue to be managed in accordance with the Wilderness Act of 1964 as amended by the Alaska Lands Act. The Service also would recommend most of the non-wilderness refuge lands south of the "1002" coastal plain area be proposed for wilderness designation in Alternative F.

Alternative F shares the following management directions with Alternative A (the Current Situation). Alternative F would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats;
- o maintain traditional access opportunities;
- o provide for continued subsistence use of refuge resources;
- o maintain opportunities for trapping, sport hunting and fishing, and nonconsumptive recreational uses;
- o permit existing economic activities (such as guides and outfitters) to continue to operate in the refuge; and
- o permit limited oil and gas studies where compatible with refuge purposes.

The major difference between Alternative F and Alternative A is that Alternative F would:

- o propose most of the non-wilderness refuge lands south of the "1002" coastal plain area for wilderness designation.

Figure 40 shows the distribution of the management categories in Alternative F; Table 17 indicates the sizes of the management categories. The federal lands in the "1002" coastal plain area would be managed as a minimal management area until Congress takes action on the recommendations in the 1002(h) report. All of the refuge lands south and west of the existing Arctic Wilderness (accounting for 50% of the refuge) would be designated as either minimal management or wild river management areas. Most of the non-wilderness refuge lands would be proposed for wilderness designation in this alternative (with the exceptions of lands around Old John Lake, and lands along the lower Wind River, the Junjik River and the East Fork of the Chandler River north to Red Sheep Creek). (See Table 10 for the fish and wildlife management activities, public uses and economic uses that would be permitted in the wilderness management category.)

Figure 40 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the 22(g) lands. Oil and gas activities on the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to

Figure 40. Alternative F.

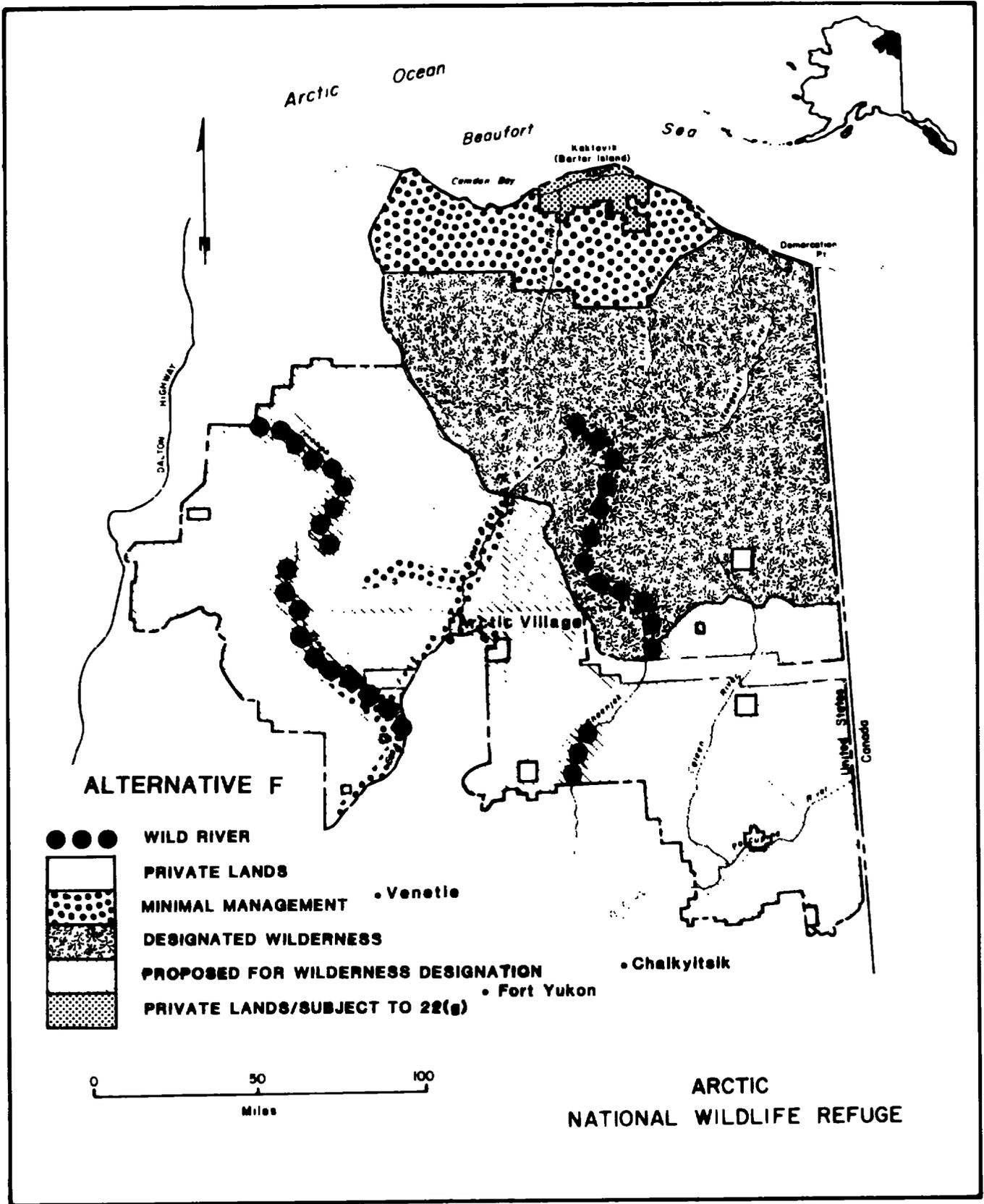


Table 17. Size of management categories in Alternative F.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness Lands
Intensive Management	0	0	--
Moderate Management	0	0	--
Minimal Management ^{b/}	10,790,000	56	--
Wild River Management ^{c/}	401,000	2	--
Designated Wilderness	8,000,000	42	--
Total Federal Lands	19,191,000	100	--
Wilderness Proposal ^{d/}	8,900,000	46	79
Native lands (subject to Section 22(g)) ^{e/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

^{b/} The 1.5 million acre "1002" coastal plain area is included in this category, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} All areas in the wilderness proposal would be managed as minimal management areas or wild river management areas (the proposal includes about 346,000 acres in the Ivishak, Sheenjek, and Wind wild river corridors) until the areas are designated by Congress.

^{e/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

environmental standards established by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

In Alternative F the Service would emphasize protection of existing fish and wildlife populations and habitats. Special attention would be given to protecting existing caribou, muskox, polar bear, peregrine falcon, Dall sheep, moose, arctic char, salmonid and whitefish populations and habitats in the refuge. The Service in cooperation with the Alaska Department of Fish and Game would monitor these populations and work with the local villages and the public to ensure that the populations are maintained. Management of hunting, fishing, and trapping (in cooperation with the Alaska Department of Fish and Game) would be the primary means of maintaining or increasing fish and wildlife populations in the refuge. Habitat improvements generally would not occur. (Refer to the "common management directions" and Table 10 for more detail on fish and wildlife management directions.)

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative F. Subsistence use would be managed as described in the "common management directions" and Table 10. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Public Use and Access Management

The "common management directions" and Table 10 generally describe how public use and access would be managed in Alternative F. The Service would maintain opportunities for hunting, fishing, trapping, and nonconsumptive recreational uses in the refuge.

Access would be managed as prescribed in Sections 1110 and 811 of the Alaska Lands Act and the Service's regulations (Title 43, Code of Federal Regulations, Part 36.11). The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods would continue to be allowed throughout the refuge, subject to reasonable regulations, for traditional activities. The use of off-road vehicles, including air boats, for recreational purposes would be prohibited.

The Service would continue to manage public use on the Arctic Refuge as it has in the past in this alternative. Primitive camping would be allowed on all refuge lands. The Service would not provide new public use facilities to increase access opportunities. In the future the Service may have to place time limits on a seasonal or area-specific basis with regard to how long groups would be able to camp at one location. This action would be taken to minimize the potential for adverse impacts to fish and wildlife.

Oil and Gas Management

The Service would permit only limited oil and gas studies south of the "1002" coastal plain area, where compatible with refuge purposes, as noted in the "common management directions" and Table 10. In the Arctic Wilderness motorized surface equipment generally would not be permitted for oil and gas studies. All oil and gas studies would be subject to reasonable regulations through mitigation and monitoring to minimize impacts to fish and wildlife resources and to subsistence activities.

Under Section 1003 of the Alaska Lands Act oil and gas production and oil and gas leasing are not permitted in the Arctic Refuge.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Other economic uses, including commercial timber harvesting, sand and gravel removal, and construction of transmission lines/pipelines, would not be permitted on refuge lands (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation).

Wilderness Proposal and Associated Management Actions for Alternative F

As noted above, in Alternative F the Service would propose wilderness designation for most of the non-wilderness refuge lands south of the "1002" coastal plain area. These lands are suitable for wilderness designation, as identified in the "Wilderness Review" in Chapter IV. The Service would continue to maintain the high resource values of the proposed area through minimal management if it is not congressionally designated as wilderness.

The Alternative F wilderness proposal does not include the "1002" coastal plain area. The 1002(h) report to Congress outlines the Department of Interior's recommendations for the "1002" coastal plain area--wilderness designation is not consistent with the Secretary's recommendations for this area (see the Secretary of Interior's recommendations for the "1002" area in Appendix L.) Congress will ultimately determine whether this area should be designated as a wilderness area.

Wilderness Management Actions - If Congress designates the proposed area as wilderness, the Service would manage the area in the same way as it manages the existing wilderness area (see the management category description and Table 10 in the beginning of this chapter). Access for traditional activities, including subsistence use, trapping, and recreational hunting and fishing, would continue to be permitted in accordance with Titles VIII and XI of the Alaska Lands Act. New permanent structures would only be permitted for administrative and public safety purposes under the provisions of Sections 1303 and 1315 of the Alaska Lands Act.

Management actions that would affect wilderness values or the significant wilderness issues are referenced below.

Wilderness values - The Service would protect the wilderness values in the proposed wilderness area in the same way that it protects the existing Arctic Wilderness. No special actions would be taken to protect wilderness values other than those noted in the description of the management categories and in Table 10.

Oil and gas exploration and development - The Service would apply the same management directions to the new wilderness area as it does to the existing wilderness area (see Table 10 and the "oil and gas common management direction"). Limited oil and gas studies would be permitted in the new wilderness area. The scenario for Alternative F in Chapter VI assumes that only surface geologic studies would occur south of the Brooks Range, in the proposed wilderness area.

Oil and gas leasing is not permitted in the Arctic Refuge under Section 1003 of the Alaska Lands Act. Oil and gas leasing also would not be permitted in a wilderness area. The scenario for Alternative F thus assumes that oil and gas leasing would not occur on refuge lands (excluding the "1002" coastal plain area).

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative F scenario assumes that one mine near the Christian River, in the proposed wilderness area, would be developed in the future. As noted in the "common management directions," the Service would closely monitor the mining activity to ensure impacts to refuge resources are minimized.

Commercial timber harvesting - Under this alternative no opportunities would be provided for commercial timber harvesting--with all of the refuge proposed either for minimal management or wilderness designation, commercial timber harvesting would not be permitted. The scenario for Alternative F thus does not include the a timber harvest operation in the Porcupine River area.

Management Costs

To implement Alternative F, the Service would need 8 more permanent staff and a 66% increase in funding over the current annual operations and maintenance budget (\$1.1 million in Fiscal Year 1987). Additional funding and staffing would be needed to manage the expected increase in public use, expand the Service's interpretive and environmental education program, increase law enforcement, monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary, and conduct needed research studies (particularly on the south side of the Brooks Range).^{a/}

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Alternative G

This alternative was developed in response to an alternative proposed by the Northern Alaska Environmental Center and other conservation groups during the planning process. The alternative, called by the groups "The Last Great Wilderness Management Alternative," was described in a letter to the Service, dated January 20, 1987.

Alternative G is intended to maximize protection to the refuge's wilderness qualities, maximize protection of the refuge's fish and wildlife populations and habitats in their natural diversity, and maintain high quality opportunities for hunting, fishing, trapping, and nonconsumptive recreational activities. The alternative emphasizes visitor self-reliance, independence, freedom and challenge, and minimizes government involvement in the experience. Reasonable access would be provided, but limits would be placed on mechanized access into the refuge. Development of facilities and economic uses would be highly restricted.

Under Alternative G the Service would propose all the refuge lands (except the "1002" area) for wilderness designation. The alternative would place an additional layer of protection on refuge lands, which is intended to address existing and potential threats that face the refuge's wilderness qualities. Several of the provisions are not consistent with the Alaska Lands Act--congressional action would be required to fully implement this alternative. Consequently, all of the major actions proposed in this alternative would be included in the wilderness proposal sent to Congress.

Alternative G shares the following management directions with Alternative A (the Current Situation). Alternative G would:

- o maintain the refuge in an undeveloped state;
- o emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats; and
- o provide for continued hunting, fishing, trapping and nonconsumptive recreational uses of refuge resources.

The following management directions indicate the major differences in Alternative G from Alternative A. Alternative G would:

- o propose all of the non-wilderness refuge lands south of the "1002" coastal plain area for wilderness designation;
- o prohibit the construction of any permanent administrative, research or recreational facilities, and require the removal of several existing structures within the refuge;
- o make acquisition of inholdings in the refuge a high priority, with a portion of the refuge's annual funding dedicated to this purpose;
- o prohibit manipulation of habitats or fish and wildlife populations, including predator control and fishery management activities and facilities, for the purpose of producing "harvestable surpluses;"
- o prohibit development of new recreational improvements in the refuge;
- o prohibit oil and gas studies in the refuge (except for studies mandated under Section 1010 of the Alaska Lands Act);

- o if necessary limit the size and number of guided and unguided recreational groups using popular areas in the refuge;
- o limit mechanized access by both administrative agencies and the public in the refuge; aircraft landings would be restricted in the Firth River-Mancha Creek Research Natural Area; and
- o limit the Service's interpretative activities in the refuge.

Figure 41 shows the distribution of the management categories in Alternative G; Table 18 indicates the sizes of the management categories. All

Table 18. Size of management categories in Alternative G.^{a/}

Management Category	Acreage	Percentage of Refuge	Percentage of Non-wilderness lands
Intensive Management	0	0	--
Moderate Management	0	0	--
Minimal Management ^{b/}	10,790,000	56	--
Wild River Management ^{c/}	401,000	2	--
<u>Designated Wilderness</u>	<u>8,000,000</u>	<u>42</u>	<u>--</u>
<u>Total</u>	<u>19,191,000</u>	<u>100</u>	<u>--</u>
Wilderness Proposal ^{d/}	9,691,000	50	86
Native lands (subject to Section 22(g)) ^{e/}	92,000	--	--

^{a/} Acreage and mileage figures throughout the plan are approximate due to rounding, uncertain boundaries, and inaccuracies in information available.

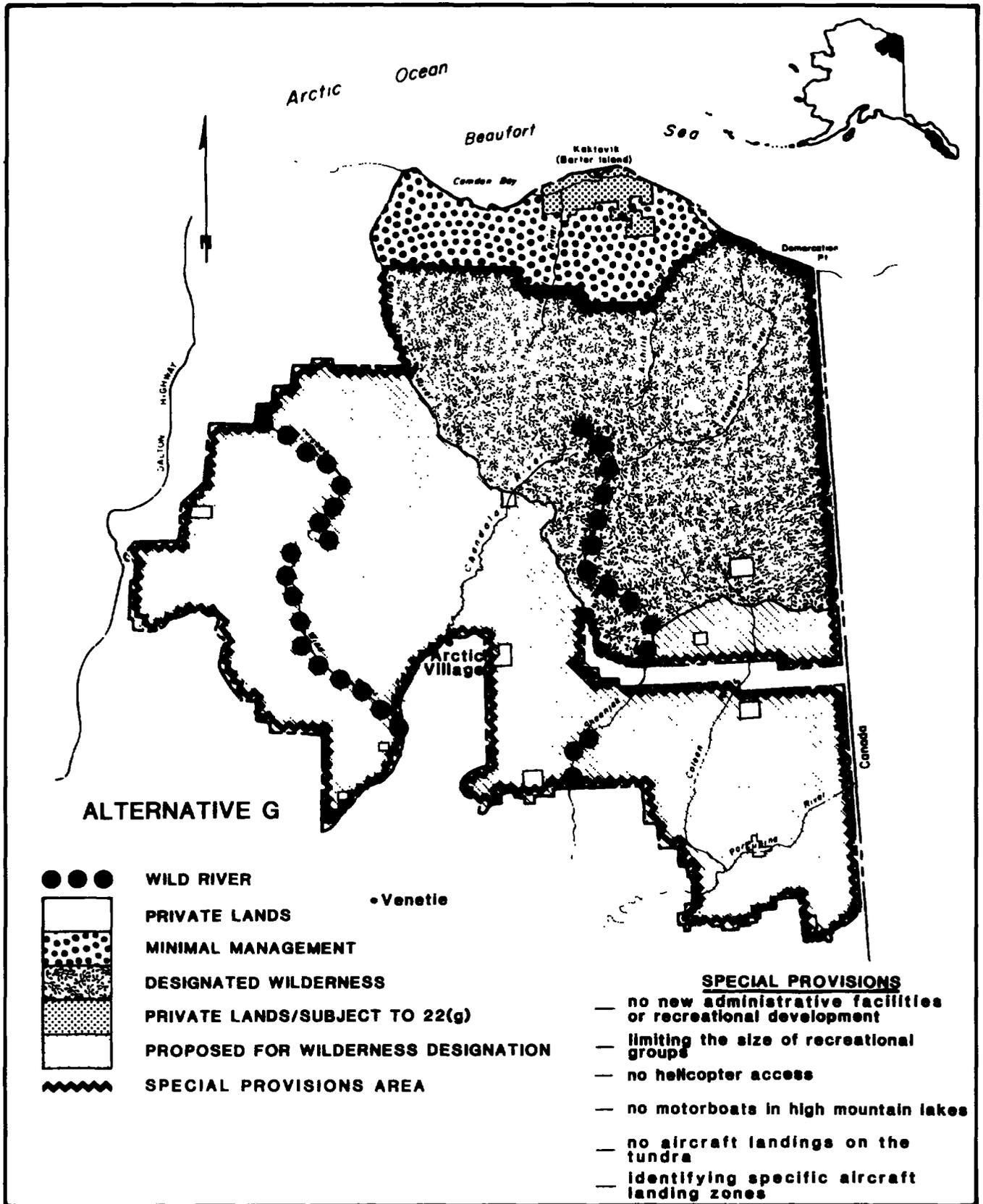
^{b/} The 1.5 million acre-"1002" coastal plain area is included in this category, pending congressional action on the recommendations in the 1002(h) report.

^{c/} Although the upper Sheenjek River in the Arctic Wilderness is a designated wild river, the management category only includes refuge lands outside of the Arctic Wilderness.

^{d/} All areas in the wilderness proposal would be managed as minimal management areas or wild river management areas (the proposal includes about 346,000 acres in the Ivishak, Sheenjek, and Wind wild river corridors) until the areas are designated by Congress.

^{e/} The Service has some residual controls over the use of Native lands that are subject to Section 22(g).

Figure 41. Alternative G.



of the non-wilderness refuge lands south of the "1002" coastal plain area would be proposed for wilderness; all of the federal lands in the "1002" coastal plain area would be managed as a minimal management area until Congress takes action on the recommendations in the 1002(h) report.

Figure 41 also shows all of the Native lands subject to the provisions of Section 22(g). Congress will determine whether oil and gas production occurs on the 22(g) lands. Oil and gas activities on the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands, which are subject to the terms of the Chandler Lake land exchange agreement, will be subject to environmental standards established by Congress for the "1002" coastal plain area. For all other uses and developments the Service will work cooperatively with the Native corporations to identify what should be permitted on the 22(g) lands.

Fish and Wildlife Management

The fish and wildlife management goal of this alternative is to maintain natural distributions, numbers, composition and interactions of all indigenous species, and to the greatest extent possible allow natural processes to control the ecosystem.

Manipulation of habitats or fish and wildlife populations for the purpose of producing "harvestable surpluses" for hunting, fishing or trapping would be prohibited. Although rare circumstances might require predator control for the protection of endangered species, in no case would predators be controlled to increase game populations. Fish stocking, egg planting, hatcheries, traps, weirs, fish ladders, artificial fishways and stream and lake fertilization also would be prohibited.

Subsistence Management

Existing subsistence opportunities would be maintained throughout the refuge in Alternative G. Subsistence use would be managed as described in the "common management directions" and Table 10. The Service would coordinate with the local village councils and corporations on refuge programs and management plans that affect the villages--local residents' concerns and recommendations would be sought on actions that affect subsistence. The Service would work with local residents to ensure that big game, small game, furbearer, marine mammal, bird and fish populations are maintained in the refuge. The Service would support the guidelines recommended by the Alaska Land Use Council to minimize trespass problems.

Inholdings

As noted in the "common management directions," the Service may pursue land exchanges for the purpose of protecting important resource values. This alternative would establish as a Service priority negotiations to acquire development rights and scenic easements of inholdings whose inappropriate use or development would threaten important refuge values. The alternative would specify that a high priority be given this goal in the Service's annual work plans for the refuge, and that a portion of the refuge's annual funding be dedicated to this purpose.

Facilities

Alternative G would prohibit the construction of any permanent administrative, research or recreational facilities within the boundaries of the refuge. It would specify removal of the structures at Elusive Lake and the upper Junjik Valley, the abandoned Distant Early Warning line sites, and the structures on the shore of Peters and Schrader lakes. All management agencies would use only temporary structures and seasonal tent camps in the refuge.

Log cabins with legitimate historic value would be allowed to remain in the refuge. Traditional and customary use of existing cabins would be allowed to continue under authorization of a permit so long as that use remains consistent with the purposes of the refuge.

Public Use and Access Management

The recreational management goal of this alternative is to ensure that wilderness experience opportunities in the Arctic Refuge are not diminished or lost. Public recreation including, but not necessarily limited to, camping, hiking, wildlife observation and study, photography, hunting, fishing, trapping, and other related activities, would be allowed to continue subject to such minimal and reasonable regulations as are deemed necessary to prevent damage to resource and wilderness values. Management would emphasize the quality and naturalness of the experience, rather than maximizing the catch or kill.

Because of the low productivity of high latitude mountain lakes, the goal in managing sport fishing there would be to minimize the fish take. Visitors would be encouraged to practice catch-and-release methods and to keep only fish that would be consumed in the area.

This alternative mandates physical and social carrying capacity research be done to limit impacts from recreational use. Appropriate use limits, based on this research, would be implemented within four years. The alternative also mandates the development of specific standards for maintaining natural and wilderness qualities, which if exceeded would require management action.

Recreational improvements, including facilities, cabins, roads, trails, campgrounds, bridges and signs, would be prohibited in this alternative.

Alternative G would limit the number of commercial guides in each area of the refuge, the numbers to be based on the results of the carrying capacity research. Necessary limitations of public use would not favor commercial guiding operations--when use of an area must be limited, those who come to do a wilderness trip on their own would not be displaced by guided groups.

Under Alternative G agency involvement in the recreational experience would be kept to a minimum. Respect for visitor freedom, independence and self-reliance would be a principal management goal. Visitor management would be kept as unobtrusive, subtle and low profile as possible. Visitor safety must be considered by the Service, but this alternative would not establish programs for visitor protection such as safety checks--the Service would not take responsibility for safety from the visitors. Prospective visitors would be made aware, before entering the refuge, that the possibility of danger is

an integral part of the area. Visitors who desire convenience, security, or a more casual experience would be advised to go to one of the many other refuges or parks in the state.

Under Alternative G the Service would not provide information to advertise the refuge or promote visitation. No brochures, signs, displays, interpretive programs or other materials would be developed that "interpret" the wilderness, or tell visitors where to go in the refuge, how to get there, and what to see. Instead, a simple informational brochure would be developed that warns of hazards and emphasizes self-reliance, preparedness and independence. The intent here is to maintain as much as possible the wilderness experience offered by the refuge, to maintain the refuge as a place where the individual finds his or her own way and interprets what he or she sees.

Access - Under Alternative G the Service would provide reasonable opportunities for mechanized access, while minimizing disturbances to wildlife and visitors from the motorized vehicles. The following provisions would apply to all administering agencies as well as to the public, and in certain cases would require congressional approval.

The use of all-terrain and off-road vehicles, including air boats, would be prohibited in this alternative.

Conventional motorboats would continue to be allowed for access on all rivers except designated wild rivers. On mountain lakes such as Peters-Schrader, Elusive and Porcupine lakes, however, motorboats would be prohibited. Jet boats would be prohibited on all waters in the refuge.

Snowmobiles would be permitted in the refuge according to the provisions of the Alaska Lands Act, except in the Firth River-Mancha Creek Research Natural Area where all forms of mechanization would be limited (see below). Snowmobiles have no established pattern of use in this area.

Helicopter landings would be prohibited in the refuge in this alternative except for emergencies or when they are the minimum tool for essential refuge management and research activities. In no case would they be permitted for recreation or agency transportation when other methods are available. A minimum flight level of 2,000 feet (600 m) would be enforced, except for emergencies or when safety considerations require otherwise.

Fixed-wing aircraft landings would be limited to durable surfaces such as gravel bars, water, ice and snow, or by special use permit where it can be demonstrated that surface disturbance will not occur. The intent of this management action is to prevent impacts to fragile tundra surfaces and other resource and wilderness values. Construction of airstrips would be prohibited.

Research in the Arctic Refuge has shown that encountering parked aircraft is considerably more detrimental to the experience nonconsumptive recreationists seek than that of hunters (Warren, 1980). For this reason, overnight parking of aircraft and aircraft camping would be temporally zoned: overnight parking of aircraft would be prohibited during the primary recreational use period (May through mid-August) but allowed after that period.

A goal of this alternative would be to provide an area that is free of all forms of mechanization, including aircraft. The Firth River-Mancha Creek Research Natural Area currently has little aircraft use. In this area a system of designated landing zones would be established, located so that several days of backpacking time could be assured between zones without seeing aircraft on the ground. No area would be so distant from a landing zone so as to preclude access by a reasonable hiking effort. The Federal Aviation Administration (FAA) would be requested to establish a reasonable airspace closure, as was done for the Minnesota Boundary Waters Canoe Area. Such a closure would not interfere with any established airways or flight routes and existing provisions for emergencies would apply.

Cultural Resource Management

In Alternative G the Service would preserve the refuge's archeological and cultural resources in their natural context. Although surficial studies may be permitted, the Service would not permit excavations and digs unless the site is threatened.

Under this alternative the Service would request that the U.S. Board of Geographic Place Names leave all currently nameless features in the refuge unnamed.

Oil and Gas Management

In Alternative G the Service would not permit any oil and gas activities in the refuge (excluding the "1002" coastal plain area and the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands), other than oil and gas studies mandated under Section 1010 of the Alaska Lands Act. Geologic studies for scientific purposes may be permitted in the refuge.

Other Economic Uses

Guides and outfitters would continue to be permitted to use the refuge, subject to stipulations, as noted in the "common management directions." Mining activity also would continue to be permitted on claims established prior to December 2, 1980. Other commercial uses, including commercial timber harvesting, sand and gravel removal, and construction of transmission lines/pipelines, would not be permitted on refuge lands (subject to the provisions of Title XI of the Alaska Lands Act and other appropriate legislation).

Wilderness Proposal and Associated Management Actions for Alternative G

As noted above, in Alternative G the Service would propose wilderness designation for all of the non-wilderness refuge lands except for federal lands in the "1002" coastal plain area. All of the non-wilderness lands are suitable for wilderness designation, as identified in the wilderness review in Chapter IV. The Service would continue to maintain the high resource values of the proposed area through minimal management if it is not congressionally designated as wilderness.

The Alternative G wilderness proposal does not include the "1002" coastal plain area. The 1002(h) report to Congress outlines the Department of Interior's recommendations for the "1002" coastal plain area--wilderness designation is not consistent with the Secretary's recommendations for this area (see the Secretary of Interior's recommendations for the "1002" area in Appendix L.) Congress will ultimately determine whether this area should be designated as a wilderness area.

Wilderness Management Actions - Under Alternative G the Service would not necessarily manage the proposed wilderness area as indicated in the description of the wilderness management category description and Table 10 in the beginning of this chapter. Reasonable opportunities for access would be provided to refuge users, but access by motorized vehicles in certain cases would be restricted. No new permanent structures would be permitted.

Management actions that would affect wilderness values or the significant wilderness issues are referenced below.

Wilderness values - The Service would take several special actions to protect the wilderness values in the proposed wilderness area in this alternative. These management actions were described above, and include limiting access, prohibiting new administrative facilities or recreational developments, limiting the size of recreational groups if necessary, etc.

Oil and gas exploration and development - The Service would not permit any oil and gas activities in the refuge, other than studies mandated under Section 1010 of the Alaska Lands Act, in this alternative. The scenario for Alternative G in Chapter VI consequently provides for surface geologic studies, but no oil and gas activities on refuge lands (excluding the "1002" coastal plain area).

Mineral development - Although there are several active mining claims in the Arctic Refuge, the level of activity is only that needed to meet annual assessment requirements. The Alternative G scenario assumes that one mine near the Christian River, in the proposed wilderness area, would be developed in the future. As noted in the "common management directions," the Service would closely monitor the mining operation to ensure impacts to refuge resources are minimized.

Commercial timber harvesting - Under this alternative no opportunities would be provided for commercial timber harvesting--with all of the refuge proposed for wilderness designation, commercial timber harvesting would not be permitted. The scenario for Alternative G thus does not include a timber harvest operation in the refuge.

Management Costs

To implement Alternative G, the Service would need 6 more permanent staff and a 52% increase in funding over the current annual operations and maintenance budget (\$1.1 million in Fiscal Year 1987). Additional funding and staffing would be needed to monitor use of the refuge to ensure wilderness qualities are being maintained, conduct carrying capacity studies and other research studies (particularly on the south side of the Brooks Range), manage the

expected increase in public use, increase law enforcement, and monitor developments occurring on private, Native and state lands adjacent to or within the refuge boundary.^{a/}

OTHER ALTERNATIVES CONSIDERED

Seven management alternatives were developed for the Arctic Refuge and are analyzed in this document. One other alternative was considered during the early stages in the planning process. This alternative was identical with Alternative D except for the size of the wilderness proposal: only the Marsh Fork of the Canning River would have been proposed for wilderness designation. It is not included here because it falls within the range of alternatives considered in this document, and would result in similar impacts to those discussed in Chapter VI. The seven alternatives presented in this document address the full range of issues and concerns raised throughout the planning process. No other alternatives are necessary to allow the full extent of activities proposed for the Arctic Refuge.

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Table 19. Summary of the alternatives for the Arctic Refuge.

Management Activity	Alternative A (Current Situation)	Alternative B	Alternative C
Fish and Wildlife	High level of protection assured	With mitigation, high level of protection assured	With mitigation, high level of protection assured
Other Resources	Water and air quality, and cultural resources protected; water resource requirements to be documented	With mitigation, water and air quality, and cultural resources protected; water resource requirements to be documented	With mitigation, water and air quality, and cultural resources protected; water resource requirements to be documented
Subsistence	Continued opportunities for harvests assured	Opportunities for harvests provided in most of the refuge	Opportunities for harvests provided in most of the refuge
Access/Transportation	Existing access opportunities maintained	Existing access opportunities maintained	Existing access opportunities maintained
Recreational Use	Existing opportunities for recreational use maintained	Existing opportunities for recreational use maintained	Existing opportunities for recreational use maintained
Oil and Gas	Compatible oil and gas studies could be permitted south of the "1002" area, with restrictions in the Arctic Wilderness; no leasing and development allowed without congressional approval	Compatible oil and gas studies could be permitted south of the "1002" area, with restrictions in the Arctic Wilderness; leasing and development could be permitted on the south side of the Brooks Range with congressional approval	Compatible oil and gas studies could be permitted south of the "1002" area, with restrictions in the Arctic Wilderness; no leasing and development allowed without congressional approval
Other Economic Uses	Guiding and outfitting and mining of valid claims permitted throughout the refuge	Guiding, outfitting, and mining of valid claims permitted throughout the refuge; other economic uses, including commercial timber harvesting, may be permitted in 29% of the refuge	Guiding, outfitting and mining of valid claims permitted throughout the refuge; other economic uses, including commercial timber harvesting, may be permitted in 29% of the refuge
Wilderness Proposal	No additional areas proposed for wilderness designation	No additional areas proposed for wilderness designation	No additional areas proposed for wilderness designation
Management Costs	Full implementation of refuge programs would require about a 30% increase in funding over current levels	Full implementation of refuge programs would require about a 94% increase in funding over current levels	Full implementation of refuge programs would require about a 87% increase in funding over current levels

Alternative D	Alternative E	Alternative F	Alternative G
High level of protection assured	High level of protection assured	High level of protection assured	Highest level of protection assured
Water and air quality, and cultural resources protected; water resource requirements to be documented	Water and air quality, and cultural resources protected; water resource requirements to be documented	Water and air quality, and cultural resources protected; water resource requirements to be documented	Water and air quality, and cultural resources protected; water resource requirements to be documented
Continued opportunities for harvests assured	Continued opportunities for harvests assured	Continued opportunities for harvests assured	Continued opportunities for harvests assured
Existing access opportunities maintained	Existing access opportunities maintained	Existing access opportunities maintained	Mechanized access, including aircraft landings, limited in the Firth River-Mancha Creek RNA; motorboats prohibited on mountain lakes; jet boats prohibited on all refuge waters
Existing opportunities for recreational use maintained	Existing opportunities for recreational use maintained	Existing opportunities for recreational use maintained	Guided and unguided recreational use may be limited if necessary to protect existing refuge wilderness values
Compatible oil and gas studies could be permitted south of the "1002" area, with restrictions in the Arctic Wilderness; no oil and gas leasing and development permitted without congressional approval	Compatible oil and gas studies could be permitted south of the "1002" area, with restrictions in the Arctic Wilderness; no oil and gas leasing and development permitted without congressional approval	Compatible oil and gas studies could be permitted south of the "1002" area, with restrictions in the Arctic Wilderness; no oil and gas leasing and development permitted without congressional approval	No oil and gas studies permitted in the refuge except for those studies mandated under Section 1010; no oil and gas leasing and development permitted without congressional approval
Guiding, outfitting and mining of valid claims permitted throughout the refuge	Guiding, outfitting and mining of valid claims permitted throughout the refuge	Guiding, outfitting and mining of valid claims permitted throughout the refuge	Guiding, outfitting and mining of valid claims permitted throughout the refuge
About 5,207,000 acres (46% of the non-wilderness lands in the refuge) proposed for wilderness designation	About 8,100,000 acres (72% of the non-wilderness lands in the refuge) proposed for wilderness designation	About 8,700,000 acres (79% of the non-wilderness lands in the refuge) proposed for wilderness designation	About 9,691,000 acres (86% of the non-wilderness lands in the refuge) proposed for wilderness designation
Full implementation of refuge programs would require about a 80% increase in funding over current levels	Full implementation of refuge programs would require about a 74% increase in funding over current levels	Full implementation of refuge programs would require about a 66% increase in funding over current levels	Full implementation of refuge programs would require about a 52% increase in funding over current levels

VI. ENVIRONMENTAL CONSEQUENCES

VI. ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The purpose of this chapter is to identify, describe, analyze, and compare the significant biological and socioeconomic impacts that would result from implementing each of the management alternatives. Each alternative contains many broad management directions. The primary differences between the seven alternatives lie in the permitted economic developments and the wilderness proposals; one alternative also significantly differs from the others in the management of public use. To provide a basis for assessing the alternatives, descriptions of likely activities and use levels were prepared. These scenarios focus on probable public (recreational) use in selected popular areas in the refuge, and economic activities (i.e., oil and gas activities, commercial timber operations, mining) south of the Brooks Range. None of the other permitted uses and activities are expected to result in significant impacts. In all of the scenarios it is assumed that reasonable management practices and the best available technology would be applied.

To assess the effect of public use, which is a significant issue for the refuge comprehensive conservation plan, a public use scenario was developed for each alternative. The scenarios are based on the management directions for that alternative and on the Service's best estimates of recreational use. It must be stressed that the use estimates are based on limited available data, and are not intended to indicate precisely the level of recreational use in 1986 or 2000. It also should be noted that the number of visitors on the refuge does not necessarily reflect the intensity of use--one user, for example, may stay in one area in the refuge for 7 days and have a different impact than a user who takes a 5-day float trip down a river in the refuge.

The analysis of impacts of public use in the various alternatives focuses on two areas: Atigun Gorge and the Hulahula River. The Atigun Gorge area is close to the Dalton Highway, and is a special value of the refuge. Use of this area is expected to substantially increase if the road is opened to the general public. The Hulahula River is one of the most popular sheep hunting areas in the refuge, and is also a popular river to float. Both Atigun Gorge and the Hulahula River are expected to receive heavy public use relative to other portions of the refuge in the future.

The effects of the wilderness proposals are also assessed in this chapter for each alternative. Chapter II identified four significant wilderness issues: the effect of wilderness designation on wilderness values; commercial timber operations; mining; and oil and gas activities. Chapter V notes what management actions or developments may be permitted under each management alternative. To assess the effects of wilderness designation, the scenarios for each alternative address the above potential developments. The effects of each potential development are assessed independently in each alternative. Alternative A, with no new proposed wilderness area, serves as a baseline to evaluate the effects of the other alternatives.

It should be noted that developments and management actions are included in the Alternative B and C scenarios that could not be implemented by the Fish and Wildlife Service without congressional approval. These scenarios are included to assess the full range of possible management options for the Arctic National Wildlife Refuge and to assess the effect of wilderness designation. Before the developments in the scenarios could be permitted, detailed compatibility statements would have to be prepared.

The management and use of the "1002" coastal plain requires special attention. The refuge comprehensive plan treats the federal lands in the "1002" area as a minimal management area in all of the alternatives, pending congressional action (see Chapter V). This chapter therefore only assesses the effects of minimal management for the "1002" area. At some point in the future Congress will take action which affects the use and management of this area. Potential impacts to the "1002" area from geological and geophysical exploration, exploratory drilling, oil and gas development and production, the potential cumulative effects from developments outside of the refuge boundary, and the potential effects of designating the area as wilderness are addressed in a separate document, the Arctic National Wildlife Refuge, Alaska, coastal plain resource assessment and final legislative environmental impact statement (Clough, Patton, and Christiansen, 1987). The 1002(h) report is available at U.S. Fish and Wildlife Service Washington D.C. and regional offices, and U.S. Geological survey libraries and public inquiries offices.

If and when Congress takes action on the management of the "1002" area the Service will revise the refuge comprehensive conservation plan to incorporate congressional directives. Management of the "1002" area may have a significant bearing on management of the rest of the refuge (e.g., on the need for transportation and utility corridors, air and water quality, fish and wildlife management). If necessary, major revisions outside the "1002" area will be made in the plan following the National Environmental Policy Act process.

In all of the scenarios, development of private inholdings and adjacent lands could occur, which in turn could affect the refuge. It is assumed that the Service would cooperate with the Native corporations and other adjacent landowners to minimize impacts. It should be emphasized, however, that developments outside of the refuge collectively may have a very different impact on refuge resources and users than may be portrayed at this time.

It is assumed in all of the scenarios that the regulatory process administered by the Alaska Boards of Fish and Game would avoid excessive harvests. Should a resource allocation become necessary between competing user groups, local subsistence users would receive priority over commercial and recreational users, as prescribed by federal law.

The reader should understand that neither the Service's selection of a preferred alternative nor the adoption of a plan necessarily means that all of the specific use levels and developments outlined in the scenarios, including timing and locations, would happen exactly as described. The scenarios are sets of reasonable assumptions and estimates that provide a basis for assessing each alternative.

Definitions

Comparison is fundamental to environmental assessment. Alternatives are evaluated by comparing potential impacts. Potential impacts are predicted by comparing the "current situation" projected into the future with other alternative futures. Because of the general nature of the assessment and the lack of numerical and statistical information regarding refuge resources, impacts are often expressed in relative terms. The meanings of these terms are as follows:

Fish and Wildlife Resource Impacts

- o Major impact - affecting a regional or local population of a species sufficiently to cause a decline in abundance or a change in distribution beyond which natural recruitment would not likely return that population to its former level within several generations.
- o Moderate impact - affecting a portion of a regional or local population sufficiently to cause a change in abundance or distribution over more than one generation, but unlikely to affect the integrity of the regional population as a whole.
- o Minor impact - affecting a specific group of individuals of a population in a localized area for one generation or less; the integrity of the regional population is not likely affected.
- o Negligible impact - the degree of anticipated biological impact is considered less than minor.
- o Short-term impact - for wildlife species a change that persists less than five years from the onset of disturbance; for fish species a change that persists less than one year.
- o Long-term impact - for wildlife species a change that persists five or more years from the onset of disturbance; for fish species a change that persists more than one year.

Water Quality Impacts

- o Major impact - extensive changes in the physical, chemical, or biological parameters of a waterbody to a degree that renders the waterbody unacceptable for use by humans or fish and wildlife species, creates a health hazard, or otherwise impairs the beneficial uses of the waterbody.
- o Moderate impact - a statistically significant change in the physical, chemical, or biological parameters of a waterbody that cannot be overcome without man-induced corrective measures.
- o Minor impact - a change in some or all of the normal measures of water quality, such as oxygen content, temperature, transmittance, trace metal concentrations, and hydrocarbon levels, but the change is either not statistically different from ambient conditions or the change deviates significantly but the waterbody can rapidly recover naturally.

- o Short-term impact - a change that persists for one year or less.
- o Long-term impact - a change that persists for more than one year.

General Assumptions

Several assumptions hold for all of the scenarios that were developed for the management alternatives:

- o Present trends of socioeconomic and demographic variables (e.g., population growth rates of the state, the cost of air taxis, the state of the economy) and environmental variables (e.g., weather) that affect use of the refuge would continue into the future (to 2000).
- o Little population growth would occur in the region.
- o World market conditions for forest products and minerals would not attract investors to the region.
- o No facilities would be built on refuge lands or inholdings that increase access by recreational users (e.g., air strips, lodges).
- o Surface transportation methods in the region would remain the same as the present, with one exception: the state would completely open the Dalton Highway (also called the Haul Road) in 1990 to provide additional recreational opportunities for state residents and tourists. Most recreational users would continue to reach the refuge using air taxis flying out of Fort Yukon, Prudhoe Bay, Kaktovik and Fairbanks.
- o About 20% of the recreational users (primarily hunters) would fly into the refuge using their own planes.
- o If oil and gas development occurs in the refuge, sport hunting, fishing, and other recreational activities would be restricted in the area of operations.
- o Subsistence use is assumed not to significantly increase--changes in state or federal laws or regulations would not markedly change the subsistence harvest.
- o The number of trappers using Arctic Refuge would remain unchanged through 2000.
- o The Arctic Refuge's reputation for high quality wilderness recreational uses would attract more visitors as the refuge becomes more widely known in the next ten to fifteen years.
- o Solitude would continue to be a primary motivation for most recreational users visiting the refuge.

- o Hunting, hiking, and river float trips (using non-motorized boats) would continue to be the three primary recreational uses of the refuge.
- o Current "heavily" used recreational use areas (e.g., the Hulahula, Kongakut, Sheenjek rivers, Peters-Schrader lakes) would continue to be the most popular areas during the next ten to fifteen years.
- o To simplify the analysis, primary recreational uses are assumed not to overlap (e.g., floaters primarily float rivers and do not hunt or hike; hunters primarily hunt and do not float rivers).
- o The state's guiding regulations would remain the same as those in force in 1987 - e.g., 14 big game guides would continue to be granted exclusive guiding rights on the refuge; 5 miles (8 km) on either side of the Dalton Highway would continue to be closed to the use of firearms.
- o Sheep would continue to be the primary species sought by hunters; caribou sport hunting also would increase.
- o Sport fishing would continue to be an incidental use of the refuge.
- o The proportion of guided to unguided groups would remain the same as it is today; the majority of use (about 70%) would continue to be unguided.
- o The length of trips recreational users take on the refuge, group sizes, and the number of clients per guide would remain the same as they are today; the number of groups using the refuge, however, would increase.
- o The revenues guides charge each client and the number of days each client is on the refuge will remain constant in all of the alternative scenarios from 1984 to 2000: big game guides will charge an average of \$700/client/day for sheep hunting, with each client staying an average of 7 days on the refuge; and river and hiking guides will charge an average of \$500/day with users staying an average of 7 days.

ALTERNATIVE A (CURRENT SITUATION & PREFERRED ALTERNATIVE)

Under Alternative A all of the non-wilderness portions of the refuge would be included as minimal management areas for the life of the plan. The scenario developed for Alternative A generally depicts the current level of economic uses on the refuge, including current oil and gas and mineral development (mining), and current timber operations. The scenario projects current public use levels into the future assuming more people seeking a wilderness experience continue to be attracted to the refuge (not because of any actions the Service takes); the remoteness and high cost of reaching the refuge, however, would limit the expected increase in public use.

Public Use Scenario

In the Alternative A scenario the Service would continue to manage public use in the refuge as it has in the past. Opportunities for hunting, fishing and other recreational uses would be maintained.

Several areas in the refuge are popular for recreational uses: river rafting is popular on the Kongakut, Sheenjek and Porcupine rivers; Peters-Schrader lakes and Caribou Pass are popular hiking areas; and the Hulahula drainage is a popular hunting area. The Alternative A scenario assumes these areas will continue to receive the majority of public use during the next 10-15 years. In addition, the west side of the refuge near the Dalton Highway (particularly the Atigun Gorge area) is assumed to become a popular area for bow hunters and hikers when the highway is opened to public use--this area is within a few miles of the road, would be easily accessible, and contains both scenic and wildlife values that would attract visitors. Tables 20-22 project guided and unguided use levels for hunting, floating and hiking in different areas in the refuge in the year 2000.

- o Total public (recreational) use would increase from approximately 870 visitors in 1986 to 1,500 visitors in 2000, a 72% increase. The increase would be primarily due to the increase in unguided use--the number of unguided users would increase from an estimated 594 in 1986 to 1,070 in 2000, an 80% increase. The number of guided users would increase from an estimated 276 visitors in 1986 to 431 in 2000, a 56% increase.
- o Recreational hunting is projected to increase from an estimated 350 users in 1986 to 500 users, a 43% increase. An estimated 30% of the sport hunters (150) using the refuge would be in the Hulahula drainage, and 20% of the hunters (100) would be on the western side of the refuge, particularly the Atigun Gorge area, close to the Dalton Highway; the remaining recreational hunters (250) would be scattered throughout the refuge.
- o The number of users floating the refuge's rivers is projected to more than double, increasing from an estimated 260 visitors in 1986 to 600 in 2000. An estimated 30% of the floaters (180 people) would go down the Kongakut River, 30% (180 people) would go down the Sheenjek River, and 10% (60 people) would go down the Porcupine River; the remaining floaters (180 people) would use other rivers scattered throughout the refuge.

Table 20. Projected level of sport hunting in the year 2000 for the Alternative A scenario.^{a/}

Use Area	People per Group	Days per Trip	% User Type per Area	Total No. of Hunters	Total No. of Trips
<u>Hulahula River^{b/}</u>					
-Guided	3	7	30	45	15
-Unguided	3	7	70	105	35
<u>Atigun Gorge^{c/}</u>					
-Guided	3	7	20	10	3
-Unguided	3	7	80	40	13
<u>Other^{d/}</u>					
-Guided	3	7	30	80	27
-Unguided	3	7	70	220	73

^{a/}Hunting by local residents for subsistence purposes is not included in this table. The number of people per group, and days per trip are estimated averages in 1986, and are assumed not to change over the projection period. All use levels are projected from estimated 1986 use levels. In 1986, approximately 350 hunters used the refuge, of which 90 were guided and 260 unguided. The 1986 use levels are based on data collected in a public use survey of the refuge in the summer of 1986 (Devoe, 1986), guide reports, and the best estimates of the refuge staff. Additional assumptions used in projecting these use levels are stated in the text.

^{b/}It is assumed that 30% of all refuge hunting (150 hunters) would occur in the Hulahula drainage.

^{c/}It is assumed that 10% of all refuge hunting (50 hunters) would occur in the western boundary of the refuge adjacent to the Dalton Highway, in the Atigun Gorge area. Only bow hunting would occur in this area as it is closed to the use of firearms by the state.

^{d/}Other includes the rest of the refuge. It is assumed that 50% of hunting in the refuge (300 hunters) would be spread throughout the refuge.

Table 21. Projected level of float trips in the year 2000 for the Alternative A scenario.^{a/}

Use Area	People per Group	Days per Trip	% User Type per Area	Total No. of Floaters	Total No. of Trips
<u>Kongakut River^{b/}</u>					
-Guided	8	7	30	54	7
-Unguided	4	7	70	126	31
<u>Sheenjek River^{c/}</u>					
-Guided	8	7	30	54	7
-Unguided	4	7	70	126	31
<u>Porcupine River^{d/}</u>					
-Guided	8	7	30	18	2
-Unguided	4	7	70	42	10
<u>Other^{e/}</u>					
-Guided	8	7	30	54	7
-Unguided	4	7	70	126	31

^{a/} Only recreational trips where floating is the primary activity are projected in this table. The number of people per group, and days per trip are estimated averages in 1986, and are assumed not to change over the projection period. All use levels are projected from estimated 1986 use levels. In 1986, approximately 260 floaters used the refuge, of which 90 were guided and an estimated 170 were unguided. The 1986 use levels are based on data collected in a public use survey of the refuge in the summer of 1986 (Devoe, 1986), guide reports, and the best estimates of the refuge staff. Additional assumptions used in projecting the float trip use levels are stated in the text.

^{b/} It is assumed that 30% of all refuge float trips (180 floaters) would occur on the Kongakut River.

^{c/} It is assumed that 30% of all refuge float trips (180 floaters) would be on the Sheenjek River. The number of days per trip is only for the portion of the river within the refuge.

^{d/} It is assumed that 10% of all refuge float trips (60 floaters) would be on the Porcupine River. The number of days per trip is only for the portion of the river within the refuge.

^{e/} Other includes all of the rest of the rivers in the refuge. It is assumed that 30% of float trips in the refuge (180 floaters) would be on these other rivers, primarily north slope rivers.

Table 22. ^{a/}Projected level of hiking in the year 2000 for the Alternative A scenario.

Use Area	People per Group	Days per Trip	% User Type per Area	Total No. of Hikers	Total No. of Trips
<u>Peters-Schrader Lakes^{b/}</u>					
-Guided	6	7	40	32	5
-Unguided	4	7	60	48	12
<u>Caribou Pass^{c/}</u>					
-Guided	6	7	30	24	4
-Unguided	4	7	70	56	14
<u>Atigun Gorge^{d/}</u>					
-Guided	6	7	20	24	4
-Unguided	4	7	80	96	24
<u>Other^{e/}</u>					
-Guided	6	7	30	36	6
-Unguided	4	7	70	84	21

^{a/} Only recreational trips where hiking is the primary activity are projected in this table. The number of people per group, and days per trip are estimated averages in 1986, and are assumed not to change over the projection period. All use levels are projected from estimated 1986 use levels. In 1986, approximately 260 hikers used the refuge, of which 96 were guided and an estimated 164 were unguided. The 1986 use levels are based on data collected in a public use survey of the refuge in the summer of 1986 (Devoe, 1986), guide reports, and the best estimates of the refuge staff. Additional assumptions used in projecting hiking use levels are stated in the text.

^{b/} It is assumed that 20% of all refuge hiking trips (80 hikers) would occur in the Peters-Schrader lakes area.

^{c/} It is assumed that 20% of all refuge hiking trips (80 hikers) would be in the Caribou Pass area.

^{d/} It is assumed that 30% of all refuge hiking trips (120 hikers) would be in the Atigun Gorge area, the closest point of the refuge to the Haul Road.

^{e/} Other includes hiking trips in the rest of the refuge. It is assumed that 30% of hiking trips in the refuge (120 hikers) would be in these other areas, primarily the mountains in the Brooks Range.

- o The number of hikers using the refuge is projected to increase by 54%, rising from an estimated 260 users in 1986 to 400 users in 2000. An estimated 20% of the hikers (80 people) would visit the Peters-Schrader lakes area, 30% (120 hikers) would use the Atigun Gorge area, near the Dalton Highway, and 20% (80 hikers) would use the Caribou Pass area; 4 hikers would use the Firth River-Mancha Creek area; the remaining hikers would be evenly distributed across the refuge.

In the Alternative A scenario aircraft access would not be limited. For purposes of analysis it is assumed that 2 aircraft, carrying 4 hikers, land in the Firth River-Mancha Creek area in a given year.

As noted in the introduction to this chapter, the analysis of public use impacts focuses on Atigun Gorge and the Hulahula River as likely areas where impacts from recreational use could occur.

Development Scenario

The Service identified three potential types of economic development that could be proposed on refuge lands in the future: commercial timber logging, mining (hardrock minerals), and oil and gas activities. For the purposes of analysis only limited development is assumed in this scenario.

Commercial Timber Operation

In Alternative A all non-wilderness refuge lands would be designated as minimal management areas and wild river management areas. No commercial timber operations are occurring on the refuge. This use would not be permitted in the refuge in the future under minimal management. For the purposes of analysis it is assumed that commercial timber operations would not occur on the refuge over the next 50 years.

Mining

There are nine active mining claims on the Arctic Refuge. All of the activity occurring on the claims is limited to that necessary for annual assessments as prescribed in the Mining Law of 1872. Very little activity actually occurs on these claims, as the annual assessment is only \$100 per claim--one trip to a claim during a season would cover the required assessment outlay. This assessment work must occur every year to keep the claims active. For the purposes of this scenario, it is assumed that mining activities on the refuge would not expand beyond the current level over the next 50 years.

Oil and Gas Activities

Limited oil and gas studies have been done on refuge lands south of the Brooks Range. In Alternative A, geologic studies, including surface rock collection, gravimetric surveying and geological mapping activities, would be permitted on a site-specific basis throughout the refuge. In addition, seismic surveying and subsurface core drilling could be permitted south of the "1002" area, with restrictions placed on activities in the designated wilderness. Because of the expense involved in field work, however, seismic studies and core drilling would likely occur only on lands that would be available for oil and gas

development. Under Section 1003 of the Alaska Lands Act, all of the Arctic Refuge is closed to oil and gas production and leasing or other development leading to oil and gas production. Fish and Wildlife Service regulations (Title 50, Code of Federal Regulations, Part 37) also presently close the "1002" coastal plain area to further oil and gas exploration. For the purposes of analysis, it is assumed in the Alternative A scenario that only surface geologic studies would occur south of the "1002" coastal plain for the next 50 years--seismic surveying, core drilling, and oil and gas leasing would not occur.

For the surface geologic studies it is assumed that:

- o One or two geologists would be involved.
- o Field operations would be helicopter supported.
- o Field operations would take place during the summer.
- o Rock specimens would be collected.
- o Housing and logistics would be based in Fort Yukon.

Biological Effects of Alternative A (Life of the Plan - 15 Years)

Vegetation

Changes in vegetation on refuge lands today occur due to natural events, such as floods or fire or naturally occurring successional changes. The Service is not undertaking habitat management activities such as mechanical manipulation or prescribed burning at this time. Thus, human activities within the refuge are not having a significant effect on successional stages of vegetation. This would not be expected to change under Alternative A.

Fish

The important rivers, lakes, and streams within Arctic Refuge would be protected in minimal management, existing wilderness, and wild river corridors in Alternative A. Although public use of the refuge's rivers, lakes, and streams is expected to increase in the future, sport fishing efforts in both guided and unguided parties will continue to be incidental to other recreational pursuits. Popular camping areas and access points, such as the lower airstrip on the Kongakut River, the Hulahula River and the Sheenjek River could be subject to overfishing. Although population and harvest level data are presently insufficient to allow reliable projections, it is possible that the projected increases in recreational use may have minor impacts on sportfish populations (arctic char and arctic grayling) in the Hulahula, Kongakut, and Sheenjek rivers. With adequate monitoring and harvest restrictions it would be possible to mitigate or reverse these impacts. Minor water quality degradation could occur in the immediate vicinity of popular camping sites on the Peters/Schrader lakes, and the Hulahula, Kongakut, Sheenjek, and Porcupine rivers (and other refuge waterbodies if use increases appreciably) as a result of increasing numbers of float trips, hunting parties, and other user groups, but the effect on refuge fish populations would be negligible.

Local communities adjacent to the refuge probably will have slowly increasing human populations, and subsistence use levels will increase slightly as a result. Continued subsistence use of refuge fish is expected to have a negligible impact on resident and anadromous fish that inhabit refuge systems.

Because Alternative A places refuge lands south of the Brooks Range in minimal management, no commercial uses would significantly affect refuge fisheries. The annual assessment work on existing mining claims within the refuge would have negligible effects on fisheries resources. Human activities associated with surface geologic studies would have no impact on the refuge's fish populations.

With refuge rivers, lakes, and streams placed in minimal, wilderness, or wild River management categories, limited public and economic uses, and adequate enforcement of sport fishing regulations, refuge fish populations are expected to remain at or near present levels in the future. Overall, activities allowed in Alternative A would have a negligible effect on anadromous and resident fish in Arctic Refuge.

Waterfowl

All of the refuge's important habitats for swans, ducks, geese, and other aquatic birds would be protected in minimal, existing wilderness, and wild river management categories in Alternative A.

Aquatic birds, such as tundra swans and sandhill cranes, are sensitive to disturbance, particularly during nesting. Human activities can cause nest abandonment and reduced reproductive success. High density nesting and molting use by ducks and geese occurs along the coastline and wetlands of the North Slope. Increasing recreational use of North Slope rivers for floating, hiking, and camping could have a minor adverse impact on feeding and nesting waterfowl along floodplains, adjacent ponds, and wetland areas. These birds could be displaced into less suitable habitats if a series of float trips or hiking parties and aircraft traffic in high-use drainages prolongs disturbance during the sensitive nesting period. However, disturbance would be very localized and would not reduce refuge waterfowl populations' overall numbers.

While most of the spring and fall staging and summer breeding habitat for waterfowl is located on the coastal plain, the many small marshes, lakes, streams, and rivers south of the Brooks Range also support small numbers of waterfowl during the summer months. Because concentrations of waterfowl using the south side of the refuge are much smaller, effects of recreational users on refuge duck, goose, and swan populations would be negligible. Increasing numbers of recreational hunters in the fall would have a negligible effect on nesting and staging waterfowl and other aquatic birds.

With all refuge lands south of the Brooks Range in minimal management areas in this alternative, no commercial uses would significantly affect the refuge's waterfowl populations. The annual assessment work on existing claims within the refuge, required by the Mining Law of 1872, would have negligible effects on aquatic birds. Surface geologic studies require no habitat modification and few personnel. Human activities associated with geologic studies would have no impact on the refuge's swan, duck, and goose populations.

With refuge rivers, lakes, streams and wetlands placed in minimal, existing wilderness, or wild river management categories and limited public and economic uses of the refuge, waterbird populations are expected to remain at or near present levels in the future. Overall, activities allowed in Alternative A would have a negligible effect on waterfowl and aquatic birds in Arctic Refuge.

Shorebirds

The level of public use in the refuge and the economic uses (i.e., mining assessment work, surface geologic studies) in the Alternative A scenario would have a negligible impact on shorebird distributions and on nesting shorebirds within the refuge. Concentrations of human activities, such as camping in high use floodplains, could disturb shorebirds, but the effect would be brief and localized. As boat and air traffic increase, small numbers of shorebirds could be displaced to more remote drainages. Shorebirds migrating across the refuge in spring and fall likewise would be little affected.

Overall, this alternative would have a negligible impact on the refuge's shorebird populations.

Raptors

Important raptor nesting habitats in Arctic Refuge occur throughout the rocky cliffs and pinnacles of the Brooks Range and foothills. In addition, the threatened and endangered subspecies of peregrine falcon nest on the North Slope and along the cliffs along the Porcupine River. All of the key raptor habitat on refuge lands would be included in minimal, existing wilderness, or wild river management areas under Alternative A.

Increased recreational use and aircraft traffic could occur in this scenario along refuge rivers during the early summer when raptor pairs establish their territories and nest sites. Although the tolerance of raptors to disturbance varies among species as well as individuals, breeding raptors generally are very sensitive to disturbance (Newton, 1979). The increase in recreational use could displace some birds into more remote, less suitable habitats; reproductive success could be lowered if adult raptors desert established use areas and raptor distributions could be altered. Disturbance of specific eagle nests and falcon nesting cliffs would be prevented by parties avoiding those areas during the early summer. If this precaution is followed, increasing recreational use within the refuge should have only minor impacts on raptor populations.

Because Alternative A places forested lands south of the Brooks Range in minimal management, no commercial uses would significantly affect birds of prey in that area. The annual assessment work on existing claims within the refuge, required by the Mining Law of 1872, would have negligible effects on raptors. Human activities associated with surface geologic studies would have negligible impacts on the refuge's raptor populations.

With all key habitats placed in minimal, wilderness, or wild river management categories, refuge eagle, falcon, hawk, and owl populations are expected to remain at or near present levels in the future. Overall, activities which would take place in the refuge under Alternative A would have a minor impact on raptors in Arctic Refuge.

Marine Mammals

All marine mammals found in Arctic Refuge use habitats along the Beaufort Sea coast, which would be in either minimal or existing wilderness management categories in Alternative A. Polar bears have been documented denning on the coastal plain. Whales migrate through nearshore habitats twice a year and seals use nearshore marine waters year-round. Increased recreational use levels throughout the refuge would be expected to have a negligible impact on polar bears and other marine mammals. Polar bears are usually present on the refuge in winter, when few recreational users desire to use the coastal portion of the refuge. Increased air traffic associated with increased numbers of refuge users could disturb hauled-out seals, but disturbance would be brief and sporadic.

Surface geologic studies and mining activities would have no effect on refuge marine mammal populations.

In summary, the level of public and economic uses that would occur under Alternative A would have a negligible overall effect on refuge marine mammals.

Caribou

All of the Porcupine caribou herd's key summer, winter and migrational habitats in the refuge would be protected in minimal, wilderness, or wild river management categories in this alternative. Overall, refuge caribou habitat conditions are stable and population levels are expected to remain the same or vary according to environmental conditions under Alternative A.

Increased recreational use along major river corridors during the early summer months (primarily June) could result in some individual animals being displaced from riparian habitats along rivers such as the Kongakut. Because a majority of caribou would have already migrated north prior to most of the guided and unguided hiking and floating parties, these encounters would be infrequent, highly localized, and of short duration. Recreational hunting effort on the refuge is directed primarily at Dall sheep and moose in the fall, with relatively few caribou harvested. Slight increases in recreational hunter numbers throughout the refuge would result in a slight increase in the number of caribou harvested, but the overall effect on the Porcupine caribou population would be negligible.

Of the economic activities that would be allowed on the refuge under this alternative, mining activities at current levels and surface geologic studies would not have any measurable effect on refuge caribou.

Overall, the level of public use and economic uses that would occur under Alternative A would have a negligible effect on the refuge's caribou population.

Moose

All of the key moose habitats identified within the refuge would be protected in minimal, wilderness, or wild river management categories in this alternative. Overall, available refuge moose habitat is stable and population levels are expected to remain near current numbers.

During summer, moose are distributed throughout the refuge, but hiking and float parties will be most likely to encounter moose in the riparian areas along major river systems. These encounters would be expected to involve only brief sightings, highly localized and of short duration. Brief displacement of moose would have a negligible effect on individual animals or population levels. Increased recreational hunting throughout the refuge would result in slightly increased numbers of moose harvested. There would be an increased number of moose taken primarily in the low-lying drainages south of the Brooks Range where moose concentrate during the fall and winter, but population levels within individual watersheds would experience only minor, short-term effects.

Human activities associated with current levels of mining and surface geologic studies would have a negligible effect on moose.

Overall, activities allowed in Alternative A would have negligible impacts on the refuge moose population.

Dall Sheep

All key Dall sheep habitat in the refuge would be protected in the minimal and wilderness management categories under Alternative A. Overall, the areas of high alpine and mountain habitats preferred by Dall sheep in the refuge are stable and refuge sheep populations are expected to remain near current numbers or vary according to environmental conditions.

Increasing numbers of guided and unguided recreational users (hikers and float parties) would have negligible effect on refuge populations of Dall sheep. On occasion, floaters or hikers passing in close proximity to sheep along the cliffs beside major river systems could momentarily displace sheep, but these encounters would be highly localized and of very short duration. Increased numbers of guided and unguided hunting parties will result in a minor increase in numbers of sheep harvested, particularly in well-known, easy access drainages such as the Hulahula. With continued close regulation of harvest levels, however, projected increases in sheep hunting would not result in significant adverse impacts on the refuge population as a whole.

Neither current mining assessment work, nor surface geologic studies would be expected to affect the refuge's sheep population.

In summary, the level of public use and economic uses in Alternative A would have a negligible effect on the refuge's sheep population.

Muskox

All of the key muskox habitats occurring within the North Slope drainages in the refuge would be protected under minimal and wilderness management categories in Alternative A. Muskox populations are currently increasing and they are thought to be expanding their ranges. Refuge muskox populations would be expected to remain near current levels or increase under Alternative A.

Increased recreational use of coastal plain rivers and riparian habitats by hiking and float parties would increase muskox/human encounters; displacement of animals would be infrequent, temporary, and would have a negligible effect on individual animals and the overall population. Hunting of muskox is closely regulated by permit; thus, no increase over present levels of hunting are expected in the near future. Muskox numbers within the refuge thus are expected to continue to expand.

Surface geologic studies and existing mining activities in the refuge would have no effect on muskox.

Overall, the activities allowed in Alternative A would have a negligible effect on Arctic Refuge muskox.

Brown and Black Bear

Because refuge bear densities are relatively low, human/bear encounters are uncommon. As a result of increasing guided and unguided recreational use and sport hunting in certain drainages, it is likely that human/bear conflicts would increase slightly. Some bear may be killed in defense of life and property. This is not expected, however, to significantly affect the refuge's bear population--the projected increase in public use would have a minor effect on the bear population.

Existing mining activities and surface geologic studies would have no effect on refuge bear populations.

Overall, the level of public and economic uses in this alternative would have a minor impact on refuge black and brown bear.

Furbearers

The projected level of recreational use and the economic activities that would be permitted on the refuge under the Alternative A scenario would have a negligible effect on refuge wolf, wolverine, lynx, red and Arctic fox, mink, marten, and beaver populations.

Threatened and Endangered Species

The threatened arctic peregrine falcon and the endangered American peregrine falcon both are found in the refuge. The endangered bowhead whale is found in marine waters adjacent to the refuge. The endangered Eskimo curlew may occur on the refuge, although no recent reports have been verified. Two candidate plant species under consideration for listing, Thlaspi arcticum and Erigeron muirii, also occur on the refuge. None of the proposed actions under

Alternative A would affect these species, with the possible exception of the arctic and American peregrine falcons.

The American peregrine falcon nests on the Porcupine River cliffs, and the arctic peregrine falcon may nest on rivers on the north slope which refuge users float. As noted in the discussion under raptors, breeding raptors generally are very sensitive to disturbance. Reproductive success would be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers that are known to sustain peregrine nests at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor the peregrines and river use to ensure that impacts are avoided. Overall, Alternative A would have a negligible impact on threatened and endangered species using the refuge.

Water Quality and Quantity

Increasing numbers of guided and unguided users in this alternative has the potential of polluting heavily used rivers and lakes with improperly buried wastes. Educating the public and increased river monitoring would ensure that this impact would be minor and would be centered around regularly used campsites. Refuge water quantities would not be affected.

No commercial uses would significantly affect water quality or quantity under this alternative. The annual assessment work on existing claims within the refuge, required by the Mining Law of 1872, would have no effect on water quality or quantity. Human activities associated with surface geologic studies also would not impact water quality or quantity.

Air Quality

The projected level of public use, mining activity, and surface geologic studies in the Alternative A scenario would not significantly affect the refuge's air quality.

Ecosystems

All of the refuge's aquatic and terrestrial ecosystems would be protected in this alternative. The potential for the level of public use and economic uses projected in the Alternative A scenario to alter natural processes and species diversity in Arctic Refuge would be negligible.

Socioeconomic Effects of Alternative A (Life of the Plan - 15 Years)

Human Population

This alternative would have a negligible impact on the population of communities in the vicinity of the refuge. With all of the refuge lands in minimal, wilderness, and wild river categories, limited activities would occur in the refuge. The alternative would not affect current levels of activities on mining claims, which involve only a few people. Surface geologic studies would bring a small number of people to the refuge for short periods of time, which would have a negligible effect on the regional population. Recreational use of the refuge by nonlocal people also would have negligible effect on the local communities' numbers. Thus, populations of communities in or adjacent to the refuge would not be expected to change as a result of refuge management activities in Alternative A.

Economy

Increased numbers of recreational users in the refuge would have a minor effect on local economies, primarily through increased income for air charter operators located in Fairbanks, Fort Yukon and Kaktovik. Increased numbers of guided hikers, floaters, and hunters would benefit guiding and outfitting operations slightly.

Surface geologic studies in this alternative would have a negligible effect on the local communities' economies, particularly Fort Yukon. Cash would be infused into the community as a result of increased expenditures by the surface geologic studies personnel, providing some benefits to local businesses, such as lodging, restaurants, air charter services, grocery stores, and shipping firms. Any economic stimulus would end when the mapping studies are complete.

The level of mining activities in the scenario also would have a negligible effect on the economies of the local communities.

Overall, Alternative A would have short-term, negligible, positive effect on local economies, primarily Fort Yukon.

Subsistence/Section 810(a) Evaluation and Finding

Activities allowed in Alternative A would have a negligible effect on subsistence users and the resources they use. The level of public use and economic uses described in the scenario would be expected to have a negligible to minor effect on the refuge's fish and wildlife populations--subsistence species populations would not be altered as a result of uses assumed in the scenarios (other than some animals being temporarily displaced due to the presence of people). Subsistence activities of most local residents would not be significantly affected by other uses.

The scenario projects the number of hikers, floaters, and hunters using the refuge to continue to increase in the future. As populations in the local communities continue to increase slowly, an increase in competition for resources may occur in localized areas. Increases in both local and nonlocal users would result in more frequent encounters of other user groups at popular campsites and areas with good access, such as near the Hulahula River airstrip. Some increases in the incidence of trespass on private lands probably would occur. Increased big game harvests resulting from increasing numbers of hunters throughout the refuge is not expected to adversely affect subsistence users; the Alaska Department of Fish and Game and the Service would monitor use levels to ensure that continued subsistence opportunities are maintained.

Current levels of mining activities and surface geologic studies would have no effect on refuge resources and consequently subsistence use would be unaffected by this activity.

Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents probably would grow increasingly concerned in this scenario that more "outsiders" are intruding on their way of life, reducing opportunities for subsistence activities. With increased numbers of planes, boats, rafts, and camps in the refuge, local residents would likely become concerned that their subsistence way of life is being threatened.

Availability of Other Lands - Section 810(a) of the Alaska Lands Act requires that the availability of other lands and other alternatives be considered in evaluating the effects of each refuge management alternative on subsistence uses. This comprehensive conservation plan is a refuge plan by definition and addresses the general suitability of a broad range of activities for refuge lands. Thus, although other lands may be available for the uses and activities considered, lands outside the refuge are not considered because they are beyond the scope of this plan.

Other Alternatives - Seven alternatives were developed for the Arctic Refuge plan. Five of these alternatives do not provide for new economic uses within the refuge; two would provide for additional economic uses. All the alternatives would allow for increased public uses, provided the uses are compatible with refuge purposes; one alternative, Alternative G, would limit increases in recreational uses to protect refuge wilderness values.

Findings - Under Alternative A, additional public use, and surface geologic studies are projected to occur; mining activities would continue to occur at existing low levels. With the increase in public use local residents' concerns about maintaining their traditional way of life would probably increase over time. However, refuge resources should be available in adequate quantities in this alternative for local residents to satisfy their subsistence needs. All of the possible impacts associated with Alternative A would be localized. None of the projected recreational uses in the scenario would adversely affect the subsistence fish and wildlife populations. Although the projected increases in sport hunters would increase harvest levels within the refuge, both the Service and the State of Alaska would ensure that these harvests do not adversely affect subsistence use. The Service thus concludes that Alternative A would not result in a significant restrictions of subsistence use within the Arctic Refuge.

Recreation

In Alternative A, guided and unguided hunting, fishing, hiking, camping, and floating activities would increase. Alternative A would not affect the opportunities for hunting, fishing, or nonconsumptive uses in the refuge. Projected increases in use levels may result in competition, perceived crowding, and other user group conflicts in popular areas. In particular, with the projected increase in use some sheep hunters, floaters and hikers seeking solitude may at times perceive the Atigun Gorge area, the Peters/Schrader lakes area, and the Hulahula and Kongakut drainages to be overcrowded. Conflicts between hunters and hikers are not expected because most hikers would not be using the same areas at the same time. In the future, increased competition for resources in the Atigun Gorge area may make it necessary for the Service to propose regulations to the Alaska Department of Fish and Game and the Board of Game to limit harvests or restrict specific uses.

Neither the limited annual assessment work on existing mining claims, nor surface geological studies in the Alternative A scenario would affect refuge recreational use.

Overall, Alternative A would have a negligible impact on recreation within Arctic Refuge. In localized areas (i.e., Atigun Gorge, Hulahula and Kongakut river drainages) the projected increase in recreational use could result in some minor adverse impacts such as perceived overcrowding.

Cultural Resources

Alternative A would have a negligible effect on cultural resources. Surface geological studies and the annual assessment work on existing mining claims would not be expected to affect cultural resources. Unintentional damage to sites could occur as a result of subsistence uses or recreational activities. The most potential for damage would be at frequently used camping sites, due to the possibility that the same sites were used in the past. Although public uses have potential for impacting cultural resources, damage would be avoided wherever possible by completing cultural resource inventories and evaluations, and through use of mitigation and preservation measures.

Wilderness Designation Effects of Alternative A (50 Years)

In Alternative A, no additional lands in the Arctic Refuge would be proposed for wilderness designation. All of the non-wilderness portions of the refuge would be included as minimal and wild river management areas for the life of the plan. The Service would manage lands in these categories as indicated in Table 10--all of the uses shown in the table that are compatible with refuge purposes could be permitted. Under this alternative, the Service would retain maximum flexibility for managing non-wilderness portions of the refuge in the future. With revisions of the plan, the Service could develop areas for increased public use or economic uses that would not protect wilderness values, but would be compatible with refuge purposes.

Effects on Wilderness Values

Solitude and naturalness are two of the key qualities provided in a wilderness setting. To assess impacts on wilderness values, two criteria that can be used are 1) whether the "works of man remain substantially unnoticeable and 2) whether the condition of the area remains basically unaltered - "natural" - prior to designation as wilderness.

What constitutes a wilderness experience, and what activities would adversely affect this experience, is largely dependent on an individual's expectations, perceptions, and beliefs. This difference in perceptions and viewpoints makes it extremely difficult to assess how an alternative would affect the wilderness values of Arctic Refuge, including the existing Arctic Wilderness area. Almost any amount of use in an existing wilderness area does have some impact on the solitude and naturalness of the area.

1. Naturalness - Activities which would be allowed on the refuge under Alternative A, and which could affect naturalness, include surface geologic studies, mining assessment work, and recreational use. Surface geologic studies could occur throughout the refuge, except in the "1002" coastal plain area. With the use of a helicopter in the summer, the field crew could collect rock specimens in numerous sites of geologic interest in the refuge. Impacts to refuge resources would be negligible as surface geologic studies result in essentially no surface disturbance.

Mining activity in the refuge is currently limited to annual assessment work. This situation is projected to remain so for the life of the plan under this alternative. To fulfill annual assessment requirements, one trip would occur to each of the nine active claims in the refuge during a season. With an outlay of only \$100 required per claim, very little activity would occur in these areas--only the presence of people on the claims for a short period (probably no more than two weeks each summer), some site clearing, and installation of machinery or structures would affect the naturalness of the area. Disturbance of the surface vegetative cover and displacement of wildlife would be very localized, with a maximum of 10 acres (4 ha) being affected in the refuge.

Recreational use is projected to increase refuge-wide by 72% from 1986 to 2000. With relatively easy access from the Dalton Highway, the Atigun Gorge area would be a popular area for sheep hunters and hikers. Most of the use would occur in about a 34,000-acre (14,000-ha) area. As noted in the scenario an estimated 50 bow hunters and 120 hikers would visit the gorge in the year 2000, about 5.5 times the estimated current use level.^{a/} This use would occur over a 12 week season, with most hikers visiting the area in July and August, and all of the hunters in August and September. The first week of the hunting season, the second week in August, would be the peak level of use, with an estimated 30 bow hunters and 10 hikers using the gorge. Assuming 3 people per group, the number of primitive campsites evident in the area would increase by 8 between the present and the year 2000--a maximum of 13 primitive

^{a/} It is estimated that no more than 21 hunters and 10 hikers used the Atigun Gorge area in 1986.

campsites would be evident in the area in the year 2000, most by the river.^{a/} These campsites would show signs of human use, including soil compaction, vegetation trampling, and fire pits, for the season of use. (River flooding each year would remove signs of the campsites in the floodplain.) With users often following the same routes, two or three trails would also start to show obvious signs of additional human use in the area. Litter in the area could increase up to 50% over current levels, although given the relatively small numbers of users, the sensitivity of people visiting the Arctic Refuge, and the large area they would be moving through the increase in litter would not be measurable. With increased numbers of people in the area there also would be an increased potential for bear-human encounters and bears being killed in defense of life and property. The increase in sheep hunting would result in additional sheep being harvested; it is unknown whether the population would be able to sustain this pressure with no adverse impacts. Overall, the projected increase in public use in the Atigun Gorge area could diminish naturalness somewhat for up to an estimated 34,000 acres, but most of the noticeable impact would occur near each campsite, affecting a total area of not more than one acre (0.4 ha).

In the rest of the the 10 million acres (4 million ha) south of the "1002" area and the existing Arctic Wilderness, recreational use is projected to be relatively light: at most 60 hikers, 300 floaters, and 150 hunters are projected to use this area. Even popular areas with good access, such as the Sheenjek River, probably would be visited by no more than 20 groups per year. This level of use would not be expected to result in measurable adverse impacts to naturalness.

2. Outstanding Opportunities for Solitude - In the Alternative A scenario a field crew would conduct surface geologic studies in the refuge. Although the crew could visit numerous sites in the refuge with its helicopter, the chances of the field crew being seen or heard for more than a few minutes by other refuge visitors would be negligible--the large size of the area (over 4 million acres (1.6 million ha) in the Porcupine Plateau) makes it unlikely that the few recreational users in this area (no more than 330 recreational users over the year) would encounter the field crew. Furthermore, most recreational use would occur along rivers, while the surface geologic studies would occur over a much larger area that receives little if any use due to the lack of access.

The mineral assessment work would occur on claims in the Porcupine Plateau portion of the refuge. The assessment work on the claims, involving the presence of 2 to 3 people on each claim, would entail some site clearing and installation of machinery for two weeks in the summer. Five of the claims are near the Wind River, a national wild river, but assessment work on the claims probably would not be evident to most people floating down the river--the claims are off the main river on side tributaries and the topography and vegetative cover would help hide the sites. A small degree of disruption to solitude could occur from noise generated through travel to and from the claims and from the operation of machinery at the claims. Noise from the five claims near the Wind River would affect a total area estimated to cover less

^{a/}All of the campsites would be established by the users; none would be designated or maintained as official campsites by the Service.

than 150 acres (61 ha) for no more than 30 days each year. The other claims are in areas that are not likely to be visited by recreational users. Thus, the chances of refuge visitors seeing the claims or hearing noise from work on the claims would be exceedingly small.

In the Atigun Gorge area the number of refuge users is projected to increase by 5.5 times current levels by the year 2000. With increased numbers of people, the chances of seeing another group would increase by a maximum of 160% relative to current levels in the 34,500-acre (14,000-ha) area. The highest probability of encountering other groups would be during the peak use week (the first week of hunting) along the river, where many of the 13 primitive campsites would be located, and/or along the route into the gorge.

In the rest of the refuge, south of the existing Arctic Wilderness and the "1002" area, public use is projected to be relatively light--about 510 recreational users. Public use in the refuge would be expected to occur primarily in areas with good access, such as the Sheenjek and Porcupine rivers. All of the areas would be visited by fewer than 20 groups, spread out over the summer and early fall. With this low level of use, it is not likely that most groups would see or hear other groups in the same area.

3. Outstanding Opportunities for Primitive Recreation - The geologic studies field crew would visit numerous sites in this scenario, but the crew would occupy each site for a very short period of time (less than a day). Visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of these sites.

On the nine active mining claims in the refuge opportunities for recreation would be eliminated. The assessment work would directly affect no more than an estimated 10 acres (4 ha). No people, however, would be expected to visit these areas to recreate.

As noted above, the projected increase in recreational use would affect the naturalness and solitude in limited areas and times in the Atigun Gorge area. This in turn would likely lower the quality of the recreational experience, relative to the rest of the refuge that does not experience such use. However, even with the projected increase in use refuge visitors would continue to be able to hunt, fish, view wildlife, hike, and pursue other nonconsumptive activities in a primitive setting in the Atigun Gorge area. No roads, cabins, campgrounds, or other visitor facilities would be present.

Visitors to these areas would continue to have to be self-reliant and depend on their own outdoor skills.

No other uses are projected in the non-wilderness portion of the refuge that would affect opportunities for primitive recreation.

4. Special Features - The Arctic Refuge has many special features, including the Wind, Ivishak and Sheenjek wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, Porcupine Lake, Old John Lake, the ramparts of the Porcupine River, and the upper Coleen River.

Surface geologic studies could occur in areas with special features. The field crew would only be on each site for a few hours at most, and would be collecting rock samples from the surface. No surface disturbance would be

expected with the field crew using a helicopter to reach the sites. Therefore, surface geologic studies would have a negligible effect on the flora, fauna, and geologic qualities of these areas.

Five of the active mining claims are near the Wind River, a national wild river. The assessment work on the claims, involving the presence of 2 to 3 people, some site clearing, and installation of machinery, for two weeks in the summer would affect a maximum of 5 acres (2 ha) near the river. This would have a negligible effect on the physical and biological qualities of the river corridor.

Public use in the refuge would be expected to be concentrated in a few areas with good access, such as the Atigun Gorge (see below). Most other areas with special features would be visited by no more than 20 groups per year, which would not result in adverse impacts to the special features. Increased sport hunting would result in more caribou being harvested in the refuge, but the effect on the Porcupine caribou herd would be negligible.

The Atigun Gorge area is an identified special value of the refuge because of its high scenic qualities and wildlife values. The projected increase in the numbers of hunters and hikers would not be expected to physically mar the enduring scenic/geologic values of the gorge (although as noted previously the increase in use would somewhat diminish the naturalness of an area within the gorge totaling one acre). With increased hunting, more sheep would be harvested. The effect of this harvest on the local population is unknown. But people still would be able to view wildlife in the area. Given the proximity of the gorge to the Dalton Highway, this area would continue to attract refuge users, and would be viewed as a special feature.

Conclusion - Management actions in Alternative A would not appreciably affect wilderness values on the 10 million acres (4 million ha) south of the "1002" area and the existing Arctic Wilderness--naturalness, solitude, opportunities for primitive recreation, and special features would be maintained in over 99% of the refuge for the foreseeable future under this alternative. Surface geologic studies would have a negligible effect on naturalness, solitude, opportunities for primitive recreation, and special features. Assessment work on nine existing mining claims would affect the naturalness and primitive recreation over a maximum area of 10 acres (4 ha). In the Atigun Gorge area the increase in public use during the first week of the hunting season (the peak use period) would diminish naturalness in a cumulative area totaling one acre, while opportunities for solitude and the quality of the recreational experience would be reduced, primarily along the river. Overall, the projected increase in public use would have a negligible effect on naturalness, opportunities for solitude and primitive recreation, and special features.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

With no wilderness additions being proposed in Alternative A, existing Service policies and the Alaska Lands Act would continue to govern what oil and gas activities occur on the refuge. Oil and gas studies could occur on all of the refuge lands south of the "1002" area; in the Arctic Wilderness and wild river corridors limited oil and gas studies could occur. Only surface geologic studies is assumed to occur in the Alternative A scenario. Oil and gas production is prohibited on all of the Arctic Refuge under Section 1003 of the

Alaska Lands Act (assuming it is not amended).

Conclusion - The Alternative A wilderness proposal (i.e., no additional wilderness) would have no effect on the level of oil and gas activities in the Arctic Refuge.

Effects on the Level of Mining Development

The Service would take no actions in this alternative that would affect current mining activity. Mining of valid claims could occur throughout the refuge under Section 304(c) of the Alaska Lands Act. However, based on the high cost of access into the areas and developing the mines, no development is projected to occur during the next 10 to 15 years.

Conclusion - The Alternative A wilderness proposal would have no effect on the level of mining in the Arctic Refuge.

Effects on the Level of Commercial Timber Harvesting

Under Alternative A all of the non-wilderness portions of the refuge would be designated as minimal management or wild river management areas. Commercial timber harvesting thus would be precluded in the Arctic Refuge under this alternative. As a result, some minor benefits to the local economy would be foregone.

Conclusion - Because timber harvesting is currently prohibited on the Arctic Refuge, the Alternative A wilderness proposal (i.e., no additional wilderness) would have no effect on the level of commercial timber harvesting in the refuge.

Irreversible and Irretrievable Commitment of Resources

Although no additional wilderness is proposed under Alternative A, the commitment of staff time and dollars would be an irreversible and irretrievable commitment of resources. Increasing public use and future unforeseen developments could result in a gradual but irretrievable commitment of natural resources over time, and irreversible changes in the wilderness values of the lands outside the existing Arctic Wilderness.

Unavoidable Adverse Impacts

Public use is expected to increase on the Arctic Refuge under all of the alternatives. Recreational use is projected to increase 72% in the refuge over the next 10 to 15 years. This use would alter the wilderness values of naturalness, opportunities for solitude and primitive recreation in popular areas with relatively good access outside the existing Arctic Wilderness.

Short-term Use Versus Long-term Productivity

No projects have been proposed that would affect the long-term productivity of the non-wilderness lands. In the future, however, unforeseen developments could occur that would adversely affect short-term and long-term productivity of these lands. Increasing recreational use is expected to have only slight long-term impacts on refuge-wide productivity--refuge resources generally should be able to absorb projected levels of use with minimal adverse impact.

ALTERNATIVE B

The scenarios developed for Alternative B assume compatible economic development would occur on refuge lands on the south side of the Brooks Range, including oil and gas leasing and development (with congressional approval), mineral development (hardrock mining), and commercial timber harvesting. The scenario projects current public use levels into the future assuming more people seeking a wilderness experience continue to be attracted to the refuge (and not because of any actions the Service takes); the remoteness and high cost of reaching the refuge, however, would limit the expected increase in public use.

Public Use Scenario

In the Alternative B scenario the Service would continue to manage public use in the refuge as it has in the past. All of the assumptions described for the Alternative A scenario (e.g., popular use areas, proportions of different recreational uses, seasons and bag limits) would be the same for this scenario. The oil development would bring in a large number of people (over 400 workers) during the construction phase. This in turn could increase for a short time (no more than 3 years) the number of recreational users in the refuge, outside of the project area. Construction workers on their time off would fly back to Fairbanks, and then disperse into the refuge (as well as other public lands in the arctic) to hunt, hike, etc. Use levels in any given area consequently would not be expected to increase by more than 2 groups (an average of 6 users). After construction is completed the level of recreational use would be expected to drop down to pre-construction levels. The scenario thus assumes that the recreational use levels in the Alternative B scenario generally would be the same as described in the Alternative A scenario. The only difference between the two scenarios is that the number of unguided float trips down the Porcupine River would decrease: 6 unguided float trips are projected to go down the Porcupine River in the Alternative B scenario (rather than 10 trips in the Alternative A scenario).

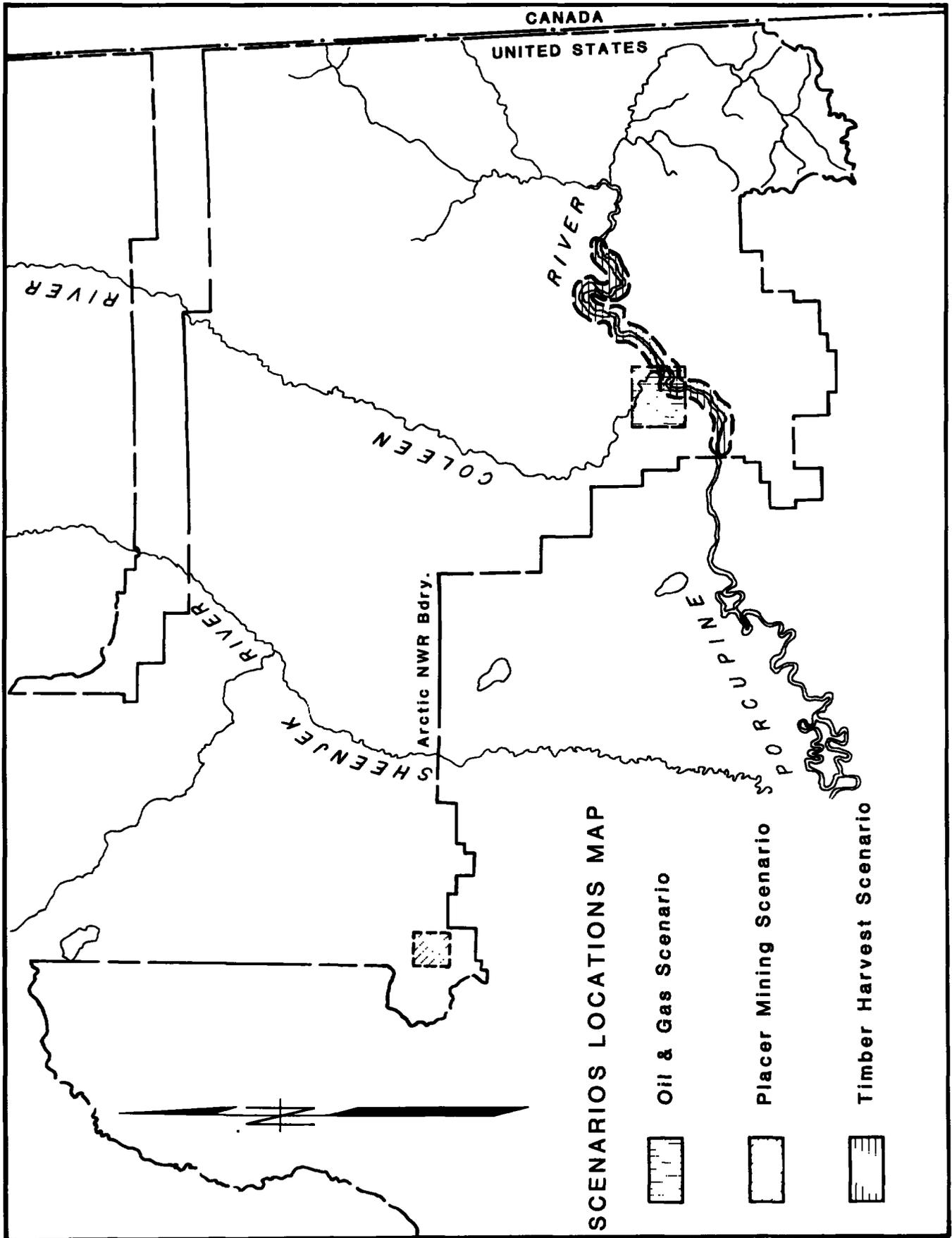
In the Alternative B scenario aircraft access would not be limited. It is assumed in this scenario that the aircraft use levels in the Firth River-Mancha Creek area would be the same as in the Alternative A scenario.

As noted in the introduction to this chapter, the analysis of public use impacts focuses on Atigun Gorge and the Hulahula River as likely areas where impacts from recreational use could occur.

Development Scenario

In the Alternative B scenario three types of economic development would occur on refuge lands in the year 2000: commercial timber logging, mining (hardrock minerals), and oil and gas activities. In this scenario it is assumed that a discovery of commercial quantities of oil is discovered in the south side of the Brooks Range, and that Congress would approve oil and gas development and production. Figure 42 shows the general location of the oil development, timber operation, and mine assumed in the Alternative B scenario.

Figure 42. General locations of developments in the Alternative B scenario.



Commercial Timber Operation^{a/}

For the purposes of describing possible impacts it is assumed that a small, local commercial timber operation would occur on refuge lands along the Porcupine River. Most local residents probably have little or no interest in participating in anything but small-scale local forestry operations. In this scenario it is assumed that Fort Yukon would be the only village that would support a commercial operation in the foreseeable future; the other villages primarily use wood for subsistence purposes (i.e., firewood, house logs), have alternative sources of timber on non-refuge lands, (e.g., Native lands), and are not willing (or able) to pay for timber available from refuge lands. For Fort Yukon it is assumed that all of the firewood needs would be met outside of the refuge--residents would not be willing to travel up to Arctic Refuge when they could harvest timber much closer to the community on Native lands and on Yukon Flats Refuge. Most of the demand for lumber also would be satisfied from nearby Native lands and from Yukon Flats Refuge. For the purposes of this scenario, however, it is assumed that some people would be willing to pay for timber from the Arctic Refuge for house logs and lumber. The scenario also assumes:

- o A special use permit would be required before commercial timber operations would be allowed on refuge lands. The permit would include a set of special conditions to ensure that resources in the area are not abused. The stipulations would address site preparation, restoration and reseeding of the site, soil disturbance, etc.
- o Lumber from the refuge would be used as construction materials to replace or build new log houses, frame houses, and public facilities. A 30 x 30 foot log cabin would use approximately 6,500 board feet of timber. Assuming Fort Yukon residents are willing to pay for timber from the refuge for five log cabins per year, about 32,500 board feet would be required from the refuge for house logs. An additional 50,000 board feet would be needed to meet lumber needs. Thus, the commercial timber operation would cut 82,500 board feet of green timber from the refuge in the year 2000.
- o All of the timber would be cut along the Porcupine River, within 200 feet (61 m) of the water, in the fall (September-October) and spring (May-June). The commercial operation would use a group selection silvicultural system, with small (not to exceed one acre or 0.4 ha) clearcut areas being created. Old growth white spruce would be the primary tree harvested.
- o In the upper Porcupine River region a maximum of 5,000 board feet of timber would be harvested per acre. In the Arctic Refuge it is assumed that a total of 20 acres (8 ha) along the Porcupine River, using the group selection silvicultural system, would supply sufficient timber to meet the annual demand from Fort Yukon residents. The 20 acres would be cut in irregular strips along the river banks rather than in one block.

^{a/}This scenario was largely based on information provided by Tony Gasbarro, Extension Forester Specialist, Cooperative Extension Service, University of Alaska, Fairbanks.

- o The timber cut along the river would be floated down the Porcupine River to Fort Yukon. A portable mill would then cut the green timber into dimension lumber.
- o Four people would be needed to cut and haul the wood and operate the saw mill. The workers would reach the refuge using motorboat, and would stay in temporary tent camps.

Mining

Nine active mining claims exist on Arctic Refuge. Two active placer claims are on refuge lands near the Christian River. In the Alternative B scenario for purposes of analysis it is assumed that a placer mining operation for gold recovery would be developed at one of these claims. The scenario assumes:^{a/}

- o All applicable federal, state and local permits would be granted before the mining operation begins.
- o The Service would monitor mining operations to ensure that all applicable state and federal laws and regulations are followed.
- o Access to the site would be through the use of an airstrip adjacent to the mining operation site. Unimproved roads, totaling less than 5 miles (8 km), would be built from the strip to the mining area.
- o Support facilities would include a bunkhouse/cookhouse, workshop, and storage facilities for equipment.
- o Mining operations would be expected to last for 10 to 15 years.
- o Mining would occur from June through September each year. Additional time may be needed to clear overburden, maintain equipment, or construct buildings.
- o The placer operation would involve two to three people and four to five acres (2 ha) of ground per season.
- o The operation would be conducted with two D-9 caterpillar tractors (cats), a sluice, and a backhoe or front-end loader.
- o The vegetation and overburden would be cleared with the cats and the mineral bearing gravels would be pushed into the sluice box for processing. Gravels would be commonly cut from a face nearby, but may be excavated from the channel itself. The gravels would be placed in the sluice and washed down with water diverted from the stream. During sluicing operations, sands and silts would be deposited in settling ponds as required by law. These settling ponds would be constructed to remove solids from the water before returning the water to the active stream channel.
- o Material that has been run through the sluice would be used to level already mined areas.
- o An average of approximately 500 cubic yards of material (380 m³) would be moved each day.

^{a/} This scenario is for a typical placer mine and is based on information in the Bureau of Land Management (1984) and on conversations with Mr. Don Keill, mining engineer, the Arctic District, Bureau of Land Management, Fairbanks.

- o An average of approximately 1.1 cubic feet per second (0.3 cms) of water would be used per day, although this could vary depending on the mining methods used. Water would be taken from an unnamed stream adjacent to the mining site. Whenever possible, water would be recycled. All clear water not needed in the operation would be diverted around the active mining area.
- o When the mining operation permanently closed down, all tailing would be recontoured. Contouring would approximate the natural contours of the area. The settling ponds would be allowed to dry and then reclaimed. The area would be left to revegetate naturally.

Oil and Gas Activities

This scenario assumes that Section 1003 of the Alaska Lands Act is amended by Congress to allow oil and gas leasing or other activities leading to production anywhere on the Arctic Refuge. Exploratory drilling and development of petroleum resources in the non-1002 portion of Arctic Refuge is highly unlikely for the near future, but could become economical as oil prices rise and arctic drilling technologies decrease exploration and development costs. Development of oil and gas on the south side of the Brooks Range in Arctic Refuge could be associated with oil and gas activities on the adjacent Yukon Flats Refuge or Native corporation lands along the Yukon River.

Based on information from the Bureau of Land Management, the Tatonduk terrane underlies the southeastern portion of the Arctic Refuge (in addition to the northern half of Yukon Flats Refuge). This area is thought to have moderate oil and gas potential (Banet et al., 1987). For purposes of analysis it is assumed that this moderate potential extends into the southeastern portion of the Arctic Refuge. It is likely that oil and gas activity in the area would be limited drilling of exploratory wells without a discovery of hydrocarbons in commercial quantities. However, for purposes of assessing the possible impacts associated with each phase of oil and gas related activities, the following scenario was formulated.

In the Alternative B scenario geologic studies, including surface rock collection, gravimetric surveying and geological mapping activities, would be permitted on a site-specific basis throughout the refuge. These activities require essentially no surface disturbance. In addition, seismic surveying and subsurface core drilling would be permitted in the non-wilderness portion of the refuge. The refuge manager would determine which specific seismic survey methods would be permitted based on the specific needs of the study and the resources that may be impacted. The Alternative B scenario assumes that surface geologic studies and seismic surveys indicate favorable subsurface conditions and commercial quantities of oil between the Coleen and Porcupine rivers, on the south side of the Brooks Range. Specific assumptions regarding oil and gas activities on refuge lands south of the Brooks Range are listed below.

Surface Geologic Studies:

The assumptions for surface geologic studies in this scenario are the same as those described in the Alternative A scenario.

Core Sampling:

- o Core drilling would be completed within two years.
- o Field operations would take place from December through April to minimize disturbance of vegetation and wildlife.
- o Small, helicopter transported drilling rigs would be used to obtain core samples.
- o Cores would be approximately 2 inches (5 cm) in diameter and a maximum of 250 feet (80 m) deep.
- o Drill cuttings would be returned to the bore holes.
- o Core drilling operations would use fresh water as drilling fluids. Stipulations would be developed to ensure that use and disposal of water would not degrade refuge waters.
- o A crew of 50 people would conduct the surveys and provide logistical support.
- o Logistical support and worker housing would be based in Fort Yukon.

Seismic Studies:

- o All proposed shot lines would be reviewed and approved by the refuge manager prior to field operations.
- o Key fish and wildlife habitats identified by refuge staff would be off limits to seismic field crews.
- o Field operations would take place from December through April to minimize disturbance of vegetation and wildlife.
- o State-of-the-art seismic survey techniques would be used.
- o Seismograph units would be transported by helicopter.
- o Geophones and cable would be moved along seismic traces by snowmachine, low-pressure vehicle, or on foot.
- o Seismic lines would not be clear cut.
- o Duration of seismic surveys would not exceed 3 consecutive winters.
- o The seismic energy source would be small dynamite charges placed on boards to avoid boring of shot holes.
- o A crew of 20, using 3 helicopters and 10 snowmachines or low pressure vehicles, would conduct seismic surveys for three consecutive winters.
- o Nine seismic lines would be run for an estimated 135 miles (220 km) through the refuge.
- o Logistical support and worker housing would be based in Fort Yukon.

Exploratory Drilling:

For purposes of assessment of impacts, the scenario assumes that oil and gas exploration and development would occur in the general area just west of the confluence of the Coleen and Porcupine rivers (Figure 42). It is assumed that in the southern portion of the refuge there is a roughly equal chance of finding either oil or natural gas. However, it would be most feasible to tie new fields into the existing Trans-Alaska Pipeline System (TAPS) and its infrastructure, which has no facilities for handling natural gas presently. The scenario therefore assumes that oil is discovered in commercial quantities in the Coleen/Porcupine vicinity and associated natural gas is reinjected.

The scenario assumes in the exploratory drilling operations that:

- o Drilling activities in the Porcupine River area would occur during one winter. An ice airstrip, ice roads, and a field camp would be built in close proximity to the well sites. After site preparation and rig-up are completed, three wells would be drilled from December through April. The camp would be closed in April.
- o A crew of 60 people, including rig crew and support personnel, would be required to complete each well. The camp would support two crews, a total of 120 people.
- o Staging areas, including logistical support and worker housing, would be based outside the refuge in Fort Yukon. Helicopters would provide primary logistical support to each rig site.
- o Rig components would be flown to the ice airstrip and moved by truck along the ice roads to each well site.
- o Gravel required for each drill pad (35,000 to 50,000 cubic yards or 27,000 to 38,000 m³) would be mined from the Coleen and Porcupine river floodplains in less sensitive areas.
- o Environmental guidelines and additional restrictions imposed by the refuge manager in the special use permits and approved plan of operation would apply to all operations. Drilling would be restricted to times when disturbances to fish and wildlife, particularly caribou, moose, raptors, and salmon, could be minimized. No hunting or fishing would be permitted within the area of operations.

Production:

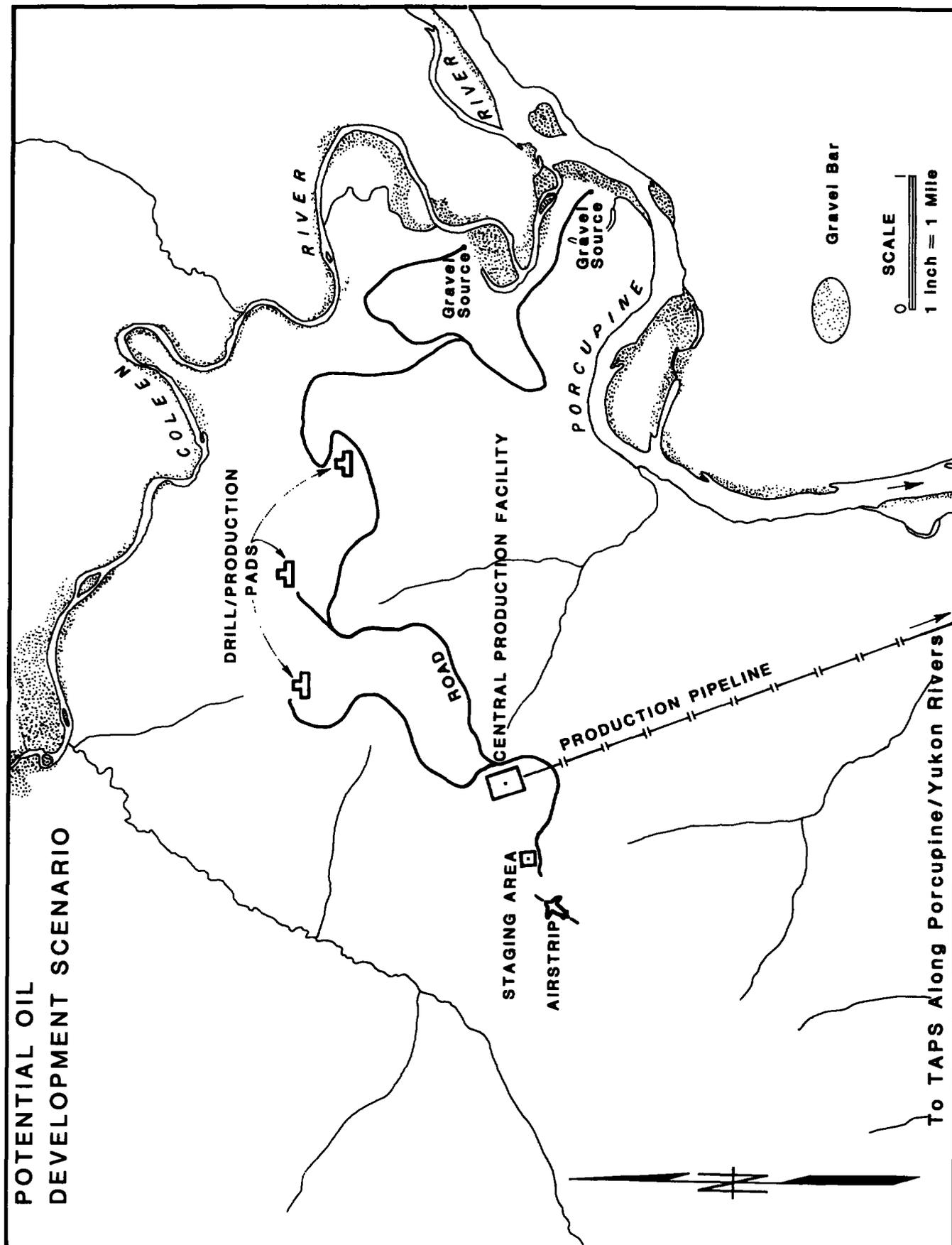
Following exploratory drilling, it is assumed that discovery of commercial quantities of oil would result in development of a production facility. An 8 to 16 inch (20-51 cm) diameter elevated main pipeline would carry the oil off the refuge, across the northern part of Yukon Flats Refuge, and across Native lands to the Trans-Alaska Pipeline System facilities at the Yukon River crossing. A 30-foot (9-m) wide gravel service road would parallel this pipeline; approximately 10 miles (16 km) of the pipeline and service road would be within the Arctic Refuge boundary.

The specific location of the production facility would depend on the actual location of the field. The scenario places the development area just west of the Coleen/Porcupine confluence and north of Burnt Paw. Figure 43 shows the location of the oil development assumed in the scenario. It is assumed, however, that a moderate sized oil field would be discovered and that the field's life would be approximately 15 years.

The production scenario also assumes the following:

- o A service road would be built parallel to the pipeline. Because the field is so remote from existing infrastructure, however, extensive use of aircraft also would be necessary to build, access, protect and monitor the system. The airstrip built during the exploratory drilling stage would be upgraded and maintained year-round for the life of the field. The minimum length of the airstrip would be 6,000 feet (1,800 m) and minimum width would be 150 feet (46 m). The airstrip would occupy a 20 acre (8 ha) area and the adjacent taxiway, apron, and support facilities and staging area would cover an additional 30 acres (12 ha).

Figure 43. Oil development scenario in the Porcupine/Coleen river area.



- o A 90-acre (36-ha) central production facility pad would provide headquarters and primary operations center for the field. Permanent housing modules would include sleeping and eating quarters, food storage area, recreational and sanitation facilities. Adjoining offices would house administrative, engineering, communications, and other support services. Production facilities would separate the production fluids into oil, gas, and water. Oil would be dehydrated and piped to market. Produced gas would probably be dehydrated and compressed for facility use, or reinjected into the subsurface structure. Produced water would be pumped to injection wells for disposal.
- o Water for domestic use would be obtained from the Porcupine River. Insulated tanks would store sufficient water for human consumption. Sewage treatment facilities would eliminate most human waste and trash. Items which could not be burned would be transported out to an approved disposal site.
- o Fuel storage tanks would hold diesel and other refined petroleum products for operating equipment throughout the field. The area would be diked for potential spill containment. Electricity would be provided by a diesel powered generation plant.
- o A minimum of three well pads, each with one production well, would be drilled in the area west of the confluence of the Coleen and Porcupine rivers. All pads would be 5 feet thick (2 m) and would require approximately 35,000-50,000 cubic yards (27,000 to 38,000 m³) of gravel per pad.
- o Gathering lines would run from each production pad to the central production facility. Pipelines would be placed on steel vertical support members. Diameter of the collector pipes would range from 3-12 inches (8-30 cm) and would be routed along roads.
- o Well pads would be connected by spur roads to a primary road leading to an airstrip and processing facilities. All roads would be built with a crown width of 35 feet (10 m) and would be 5 feet (2 m) thick. Total road mileage would depend on size and surface features in the development area.
- o Each well would be drilled in the winter and would take four to five months to complete.
- o Borrow material would be mined from the floodplains of the Porcupine and Coleen rivers or from excavation of each pad's reserve pit. Estimated gravel requirements for the production facilities and roads would be 2.4 million cubic yards (1.8 million m³). (The gravel estimate for the service road is only for the portion of the road within the Arctic Refuge boundary.)
- o Drilling fluids, muds, cuttings, and other wastes would be reinjected into the ground where geologically feasible; hazardous wastes would be removed from the refuge and taken to an approved disposal site.
- o An 8 to 16 inch (20-41 cm) diameter pipeline and accompanying service road would be built across refuge lands and private lands; the pipeline would be elevated where possible due to the presence of continuous permafrost throughout the region.
- o Approximately 71 miles (114 km) of pipeline would cross Arctic and Yukon Flats refuge lands and the remaining 139 miles (224 km) would cross private lands along the Yukon River.

- o The pipeline right-of-way would be approximately 20 feet wide (6 m) and would be cleared of vegetation. The right-of-way would be revegetated after construction.
- o The gravel service road accompanying the pipeline would be approximately 5 feet (2 m) thick and 30 feet (9 m) wide, covering 36 acres (15 ha) along the 10 miles within the Arctic Refuge boundary; public access to the road would be prohibited.
- o Pipeline construction would take approximately eight months and would employ about 250 workers.
- o Sixty people would be needed to complete each well, resulting in a total workforce of 180 people during well construction. The production phase, however, would require only one person per production well throughout the 15 year life of the field. Permanent personnel housing would be located in Fort Yukon, although a modular crew facility would be located on the pad during drilling operations.
- o Approximately 35 miles (56 km) of primary access road would be constructed along the feeder pipelines to the production pads. These haul roads would be for support of oil production facilities only and would be closed to the general public.
- o Production equipment and other related structures would be confined within a 1-square-mile area (3-km²) surrounding the production pads.
- o Field operations would be supported by helicopters and low-pressure, flexible tracked vehicles (such as Rolligons); all fuel caches, staging facilities, and permanent housing would be located in Fort Yukon or on lands outside the refuge.
- o Environmental guidelines and additional restrictions imposed by the refuge manager in the special use permits and approved plan of operation would apply to all operations. Drilling would be restricted to times when disturbances to fish and wildlife, particularly caribou, moose, raptors, and salmon, could be minimized.
- o Some personnel associated with exploration and production phases of gas production would use the refuge for recreation (e.g., fishing, hunting, hiking). No hunting or fishing by workers would be permitted within the area of operations. In other areas hunting and fishing would be regulated and monitored by the Alaska Department of Fish and Game and the Service to ensure that fish and wildlife populations are maintained.
- o For safety reasons, shooting and hunting would not be permitted adjacent to work camps, construction sites, the pipeline right-of-way, and oil production facilities.

Field Termination:

Once oil and gas are depleted within the field, the wells would be plugged and abandoned, the facilities removed, and all disturbed surfaces reclaimed as directed in federal regulations.

Biological Effects of Alternative B (Life of the Plan - 15 Years)

Vegetation

Increasing levels of public use described in the scenario would have the same negligible impacts on vegetation as described for Alternative A.

Small scale timber activities described in the scenario for Alternative B would result in minor, highly localized changes in vegetation along the Porcupine River. Within the estimated 20 one-acre (0.4 ha) strips of clear cut in the riparian area, larger diameter white spruce would be removed, allowing increased growth of shrub and deciduous understory plants. Assuming that reseedling is effective, over a period of five to ten years, each one acre strip would revegetate. Overall, these small scale timber activities would have a minor, localized effect on Porcupine River riparian vegetation, but refuge-wide, the impact would be negligible.

Placer mining activities as described in Alternative B's scenario would have major, long-term impacts on the vegetation in the entire drainage where the claim is sited. The project area is a mix of needleleaf woodland, mesic erect dwarf scrub, and moist graminoid tussock cover types. Stripping of the overburden along both sides of the stream would remove all vegetation and soil. Approximately 50 to 100 acres (20 to 40 ha) would be altered during the life of the project, with areas covered by roads, buildings, airstrips, and active clearings of approximately five acres (2 ha) per season. Vegetation in the active mining area, material borrow areas, and recent tailings pile would be destroyed. Vegetation growth in these areas would be lost for the life of the project and beyond, given slow arctic and subarctic plant growth rates.

Oil exploration and development in the Porcupine River area would result in the direct alteration of approximately 536 acres (215 ha) of combined deciduous forest, closed and open needleleaf forest, tall shrub, and mesic erect dwarf scrub areas by project facilities within Arctic Refuge. (The scenario assumes that most of the pipeline, service road, and associated development would be on Yukon Flats Refuge and private lands.) Additional vegetation alteration could be caused by ice roads and airstrips during construction phase, reserve pit fluids leaching through containment dikes, stripping of vegetation in material sites, petrochemical spills, altered drainage patterns and erosion associated with roads and pipeline pads, gravel, dust and changes of snow patterns near oil and gas infrastructure. Thus, oil development would have a major, long-term impact on the project site's vegetation.

In summary, the limited areas of development that would be allowed under Alternative B would result in major, long-term alterations of each site's vegetation, but overall, from a refuge-wide perspective, impacts on refuge vegetation would be minor.

Fish

As discussed in Alternative A, the projected increase in public use would have a negligible impact on refuge fisheries resources.

During logging activities in the early spring and fall, felled trees would be dragged over the bank immediately adjacent to the cut area, and held in collecting rafts until they are floated downriver. Some bank erosion, deposition of wood chips and debris, and increased siltation would result along the edges of the river, which would cause resident fish to move either up or downstream into undisturbed waters. Because timber activities would occur before and after Porcupine River salmon runs, logging would have no effect on migrating adult salmon. During May, however, outmigrating juvenile salmon would travel past timber harvest sites and would avoid areas of excessive turbidity and debris. The lower portion of the Porcupine River provides important rearing habitat for sheefish and other whitefishes (Stefanich, 1973). Turbid conditions resulting from timber operations may remove some of this habitat from utilization by these species or result in habitat degradation. Overall, the small-scale timber project in the scenario would have a negligible impact on Porcupine River fish populations.

Placer mining along a small tributary of the Christian River would adversely affect aquatic habitat and fish populations in the project drainage. Fish species occurring in the Christian River downstream from the project area include round whitefish, chinook salmon, chuma salmon, arctic grayling, northern pike, burbot and slimy sculpin. Both anadromous and resident fishes would be expected to move into other streams after one or two seasons of mining. Stripping vegetation, dredging, and channelizing the stream would result in erosion and increased sediment because of unstable streambanks, and possibly increased streamflows. In areas that are dewatered or have water diverted from them, fish habitat would be lost or degraded. Increased turbidity and suspended solids in the waters downstream of mining activities would adversely affect fish migration, reproduction, and feeding; young salmonids in particular, are susceptible to adverse effects from turbid waters. Changes in water chemistry from mining also would adversely affect local fish populations. All of these changes would reduce the stream's productivity. Mining thus would have a major, long-term adverse impact on local fish populations. Because of the relatively small size of mining activities in the scenario, however, the effect of mining on refuge fish populations would be negligible.

The Alternative B scenario assumes all of the non-wilderness and non-1002 lands within the refuge would be opened by Congress to oil and gas leasing. For purposes of the assessment, the scenario assumes that commercial quantities of oil are discovered and developed in the areas just west of the confluence of the Coleen River with the Porcupine River. In the area where development would occur, the rivers are important spawning habitats and migration routes for anadromous chinook and chum salmon, and sheefish, as well as providing habitats for resident species such as northern pike, several whitefish species and Arctic grayling.

Disturbances of aquatic habitats by seismic and core drilling activities in this scenario should be minor. These activities usually generate few pollution problems; however, accidental spills of fuel, or domestic solid or liquid wastes could occur. Wastes from field crews and their equipment should not affect the refuge assuming they are disposed of in an environmentally sound manner. Equipment and vehicles crossing rivers could alter the integrity of streambanks and streambeds. Use of explosives too near fish streams could result in percussion impacts. These potential impacts are not

expected to occur if seismic crews comply with stipulations on field operations. Thus, seismic studies and core drilling would have only a minor, short-duration impact on fishery resources, confined to the area of operation.

Alteration of river and riparian habitats by oil exploratory activities could impact fish populations. Possible impacts associated with exploratory activities include: stream bank erosion, increased siltation, channel obstruction and in-water construction, shock waves, substrate disturbance, long-term hydraulic changes in channels, reduced water volumes, degradation of water quality, drainage of lake basins, and alteration of surface and ground water hydrological regimes in the area of development (Hanley, et al., 1983).

Significant impacts on fish habitats could occur as a result of gravel mining in river floodplains. Potential material sites were not identified in the scenario, but well pads and other infrastructure would probably require upwards of 2.4 million cubic yards (1.8 million m³) of gravel, between exploratory and production phases. Extraction operations could rechannelize streams and tributaries, increase surface runoff and siltation, destroy spawning and overwintering habitats, create barriers to migration, and create entrapment hazards for adult and juvenile fish. Even though a relatively small reach of each system would be affected, each system's carrying capacity and productivity could be reduced. Increases in egg and fry mortality could result from even small in-stream spills or habitat degradation. Fish within the two systems could also be adversely affected by dredging and filling activities in wetlands and non-contiguous waterbodies adjacent to the rivers or trace contamination of waters with drilling muds or petroleum products. Construction of the oil pipeline and service road could potentially affect all the salmon and resident fish populations in the streams and rivers within or peripheral to the pipeline and service road right-of-way (most of the pipeline impacts would occur on Yukon Flats Refuge or private lands). Burying sections of the pipeline in or near waterbodies and construction of bridges and culverts for the service road could result in cutting of banks and bottom materials, creating downstream siltation. This could affect any downstream fish species or life stage of fish; erosion impacts associated with pipeline and road construction or possible spills would be more severe than impacts from seismic activities. Channelization of streams associated with bridges and/or perched culverts could create barriers to fish migration. The large number of stream crossings that would be necessary would increase the potential for adverse effects on fish and their habitats.

Another potential impact to fish populations could result from winter water withdrawals. If water is withdrawn from important fish overwintering areas, fish condition and survival could be affected. Impacts could range from negligible to major depending upon the importance of the overwintering area and status of the population affected.

In summary, oil and gas development in the Porcupine area would have a moderate, long-term impact on fish populations in the Porcupine and Coleen river systems. Refuge-wide, this development would have a negligible impact on overall refuge fisheries resources.

Overall, all of the public and economic uses included in the Alternative B scenario would have a minor, long-term impact on refuge fish resources, with major impacts possible in localized areas.

Waterfowl

The projected increase in public use of Arctic Refuge in this alternative would be almost identical to use levels described for Alternative A, and thus would have the same negligible impacts on refuge waterfowl populations.

Migratory cranes, ducks and geese passing through the Porcupine drainage on their way to and from North Slope and interior breeding areas would avoid the immediate logging sites while noise and human activities occur. The area of displacement would be expected to be within a half-mile radius of the one-acre clearcuts. Overall, small timber activities would have a negligible effect on refuge waterfowl.

Very few waterfowl use the habitats surrounding the mining claim in the scenario; therefore, the mining activities would have a negligible impact on refuge waterfowl.

Seismic surveys and core drilling, which would occur in the winter, would not affect the refuge's waterfowl populations.

Oil development could affect the small numbers of waterfowl that migrate through the Porcupine and Coleen drainages. Exploratory, construction, and production activities would affect wetland pockets and riparian habitats. Direct loss of habitats could be caused by heavy equipment, drill pads, feeder pipeline(s), and construction facilities. Any activities resulting in degradation of water quality in the streams, rivers, and ponds would affect waterfowl in the area of operation. Dust and traffic on roads and pads may create a dust shadow that could affect aquatic vegetation; this in turn could affect waterfowl food and decrease habitat suitability.

Disturbance impacts would decrease after construction, although noise and waterfowl avoidance of the areas of operations would occur for the life of the field. Noise and human activities that could disturb waterfowl would primarily be associated with air transportation and ground vehicle use throughout the field.

Refuge-wide, development activities under Alternative B would have a negligible impact on waterfowl populations.

Shorebirds

The projected level of public use in the Alternative B scenario would have a negligible impact on refuge shorebirds.

Very few shorebirds move through the riparian areas where the projected economic uses in the scenario would occur. Thus, timber harvest activities, mining, and oil and gas activities in the Alternative B scenario would result in a negligible impact to refuge shorebird populations.

Raptors

As discussed under Alternative A, increasing public use, particularly along rivers, could have a minor impact on refuge raptor populations. The scenario for Alternative B has three fewer float parties using the Porcupine River, where raptor nesting concentrations are high. Thus, disturbance impacts on raptors would be slightly less than in Alternative A, but the net potential impact on refuge raptor populations still would be minor.

The Porcupine River and canyon areas are used by high concentrations of breeding raptors, including golden and bald eagles; rough-legged, sharp-shinned, Swainson's, Harlan's, and goshawk; and falcons such as merlins, gyrfalcon, peregrine, and kestrels. Timber harvest activities during the fall would have little effect on these birds, but during spring, any noise and human activity could displace raptor pairs from their established territories, cause nest abandonment, and result in lowered reproductive success. Because the area is used by the endangered subspecies of peregrine, the American peregrine falcon, timber activities within known areas of traditional nesting would not be allowed. Timber harvesting during nesting could have a moderate localized impact on refuge raptor populations.

Raptors would not be expected to use the habitats in the vicinity of the scenario's placer mining operations. Birds of prey would be likely to avoid the area while mining activities are taking place; to the extent that the areas of operation would cease to support fish, small mammals, and birds, raptors would no longer feed in the area. Displacement impacts would occur for the life of the project, but the effects would be minor and limited to the watershed being mined. Placer mining as described in the scenario would have a negligible impact on refuge raptor populations.

Seismic activities and other exploratory studies carried out during the winter months would have no appreciable effect on refuge raptors. The potential oil development described in the scenario, however, would adversely impact raptors. The Porcupine cliffs and riparian areas are key habitats for raptor concentrating and breeding. Although the tolerance of raptors to disturbance varies among species as well as individuals, breeding raptors generally are particularly sensitive to disturbance (Newton, 1979). Aircraft used for transportation, heavy equipment operation during construction and production, and constant human activity associated with an oil field near the Porcupine River would disturb raptors and would cause them to avoid the entire area of operation. Traditional nesting and feeding perch sites probably would be abandoned as raptors move into other, more remote drainages for the life of the field. If birds moved into less suitable, adjacent habitats, lowered reproductive success in the endangered peregrine falcon, would have significant adverse effects. Potential oil and gas activities described in the Alternative B scenario thus would have a moderate, long-term effect on the Porcupine/Coleen raptors. However, the impacts would be confined to the area developed.

In summary, the public and economic uses in the Alternative B scenario would have moderate, long-term, localized impacts on refuge raptor populations. From a refuge-wide perspective, the impact on raptor populations would be minor.

Marine Mammals

Increased levels of public use described in the scenario for Alternative B would have negligible impacts on marine mammals within Arctic Refuge.

No marine mammals occur in the area being considered for timber harvest or placer mining, oil and gas studies, or oil development activities. Therefore, these economic uses would have no impact on refuge marine mammal populations.

Caribou

The projected public use levels in Alternative B would have the same effect as described for Alternative A: public use would not be expected to have a significant effect on the refuge's caribou populations.

Members of the Porcupine caribou herd which winter on Arctic Refuge lands use the area along the Porcupine River where timber operations would occur. If harvest activities began in April, prior to the beginning of the northward migration of caribou to the calving grounds, some animals would be disturbed by the noise and human presence associated with small-scale timber operations. The animals would move away from the river area and would avoid the area until they began their northward trek; however, this displacement would be of short duration and in very localized areas immediately adjacent to clear cut sites. Fall timber harvest would disturb fewer refuge caribou because most animals do not arrive in Porcupine River area wintering habitats until October. Overall, small-scale timber operations would have only very minor, short-term impact on caribou.

Caribou would not be present in large numbers at the placer mining site near the Christian River when most of the mining activity would occur. Wintering caribou would simply avoid the areas where structures are placed and areas stripped of vegetation and would probably migrate around the site. Overall, placer activities described in the Alternative B scenario would be expected to have a negligible impact on caribou.

Seismic surveying and core drilling conducted in areas used by wintering caribou of the Porcupine herd would have a negligible effect. By designating routes to avoid known concentration areas and by conducting monitoring programs to reduce disturbance of the animals and their habitats, impacts of these activities should be minimized--only highly localized, short-term displacement would occur.

Year-round oil and gas exploration and production activities in the vicinity of the Porcupine and Coleen rivers would have a moderate, long-term adverse impact on members of the Porcupine caribou herd for the 15 to 30 year life of the field. The potential area of development lies just outside the edge of the area of the refuge which is key wintering habitat for those animals of the herd that winter in the U.S.^{a/} Although caribou occupy the area on a

^{a/} On the average from 25 to 33% of the Porcupine caribou herd winters on the U.S. side of the border. The number of wintering caribou can vary considerably, however, from year to year. In 1986-1987, about 95% of the herd wintered in Alaska (Mauer, pers. comm.).

seasonal basis, winter seismic studies, exploratory drilling, production, and rehabilitation phase operations would result in caribou being displaced from portions of the area during various time periods when intensive activities are in progress. The exact number of caribou displaced and the degree of displacement cannot be quantified with available information. While the area of operations would be relatively small (approximately 500 acres or 200 ha), the displacement effects could be felt by caribou considerably beyond that area. Human activity associated with the facility, including noise generated by aircraft operations, drilling operations (especially that arising from power generation) and traffic, could divert movement to and from the wintering ground (Klein, 1980). Sulfur and nitrogen oxides emitted from the facility also could affect lichens, the primary food source for caribou, elsewhere in the winter range (Schofield, 1975). Displacement of caribou would occur each winter from the construction of pads and infrastructure to the closing of the final production well. Once human activities declined, the potential for disturbance would decrease.

Reaction of caribou to the facilities would depend on the intensity of oil and gas development activities. The degree to which animals avoid or shift away from this portion of their winter range would depend on their habituation to facilities, traffic, and human presence. Studies on Alaska's North Slope have demonstrated that caribou tend to habituate to obstructions if they are resident in the affected area (Klein, 1980). Because the Porcupine herd migrates over vast distances and a variety of habitats, occupying their winter range for only a few months, habituation to disturbances and infrastructure would probably take a much longer time. Alteration of traditional use patterns could occur for up to 30 years, but it is unknown what effect this would have on overall herd productivity.

Long-term cumulative effects of oil and gas exploration and development in key winter and summer habitat areas within the refuge cannot be viewed in isolation from impacts occurring in habitats outside the refuge (in Canada or on private lands). The caribou's need for varying seasonal habitats should be viewed as a whole. Interference with one phase of the annual cycle may reduce success in another phase (Cameron, 1983). The long-term reproductive success of the Porcupine caribou herd will depend on the types and magnitude of impacts from oil and gas development and other human activities both within and outside of the refuge. Adverse cumulative impacts would occur if activities take place in vital habitats, such as calving areas, migratory corridors, staging and feeding areas, and wintering habitats.

Displacement from key wintering range is less important to herd survival than conflicts in other essential habitats (calving, etc.)(Cameron, 1983). Winter herd distributions are more variable and less cohesive than calving and post-calving herd aggregations. Also, suitable replacement habitat is more likely to be available in the large winter range. Based on these considerations, displacement of wintering caribou in the small area of operation would have only minor effects on the population as a whole.

Buried portions of pipelines would not restrict traditional movements but any portions above ground could do so. Traditional movements within the winter range would be altered as caribou moved north and west to avoid the oil field. Depending on the numbers of animals which move, more animals may be taken by hunters in the Arctic Village area. In addition, as oil and construction personnel numbers increase, some additional hunting pressure and harvest would occur south of the Brooks Range. While the Porcupine herd could sustain the additional harvest levels at this time, if future cumulative impacts result in lowered herd productivity, harvest impacts would be significantly greater.

In summary, the public and economic uses in the Alternative B scenario would have a moderate, long-term impact on those Porcupine caribou wintering in the area. Refuge-wide, the uses and developments described would have a minor impact on the refuge population.

Moose

Impacts of increasing public use on moose in this scenario would be negligible, the same as Alternative A.

As discussed for caribou, noise and human presence associated with small timber operations would temporarily displace moose from the riparian habitats along the Porcupine River for a short time during spring and fall. Creating small clear cut areas would set plant succession back, allowing shrub and deciduous understory vegetation to increase and creating additional browse for moose. Small timber operations thus would have a slight, long-term beneficial effects on moose in the the Porcupine River area; however, refuge-wide, timber activities would have negligible impacts on moose.

Moose would avoid the placer mining site during the months of operation. Denuded areas and tailing areas without cover and browse would no longer have high habitat values for moose. However, the loss of 50 to 100 acres (20 to 40 ha) of habitat would have a negligible impact on moose because adjacent habitats would easily sustain existing numbers of animals. Presence of miners in the area could result in increased numbers of moose harvested, but this would be a highly localized impact. Thus, placer mining would have a negligible impact on refuge moose populations.

Oil and gas studies under this scenario would have a negligible effect on moose. Seismic survey activities and core drilling would be routed away from winter concentration areas along the rivers, mitigating potential impacts on moose.

The oil development in the Alternative B scenario would have a minor impact on moose using the riparian habitats and floodplains in the southeast corner of the refuge. Moose would avoid the areas of activity and would be expected to move into adjacent drainages, particularly during the fall rut and in the winter when they concentrate in the lower river valleys. The large influx of construction and oil and gas operations personnel into the region would be expected to increase levels of recreational hunting for moose for a short time; small increases in harvested moose would have a negligible impact on refuge populations as a whole. Direct covering of only 500 acres (200 ha) of habitat would have a minor, long-term effect, refuge-wide, on moose populations.

Overall, the public uses and economic uses in the Alternative B scenario would have a negligible impact on the refuge's moose population, with minor localized impacts possible in the Porcupine River area.

Dall Sheep

The level of public use in Alternative B would have the same effect on Dall sheep as Alternative A: although increased numbers of guided and unguided hunters would harvest more Dall sheep in the refuge, the effects of this harvest would be expected to have negligible impacts on overall refuge sheep populations.

As discussed above for moose, the influx of support, construction, and oil workers into the refuge region also would be expected to result in more Dall sheep hunters using the refuge for a short period of time, and increased numbers of sheep harvested. However, refuge sheep populations would be expected to sustain increased hunting pressure.

Dall sheep do not occur in the area where timber harvesting, placer mining, or oil and gas activities are considered in the scenario. Thus, these economic uses would have no effect on the refuge's Dall sheep populations.

Overall, the public and economic uses in the Alternative B scenario would have a negligible effect on the refuge's Dall sheep population.

Muskox

Alternative B's scenario has essentially the same public use levels as those described for Alternative A. Therefore, public use in Alternative B would have the same negligible impact on refuge muskox.

Muskox do not occur in the area where timber activities, mining, or oil and gas activities are considered in the scenario. Thus, these economic uses would have no effect on the refuge's muskox populations.

Overall, the public and economic uses assumed in the Alternative B scenario would have a negligible effect on the refuge's muskox population.

Brown and Black Bear

Increased levels of public use, particularly recreational activities, in Alternative B would have the same negligible impact on bear as discussed in Alternative A.

During timber cutting activities, bear would avoid the Porcupine River riparian areas, but displacement would be temporary. Clear cut areas, with increased shrub and deciduous vegetation as a result of altered plant successional stages, could provide additional fall food for bear and additional cover, which is preferred by black bear in particular.

Placer mining would have little effect on black and brown bear. Loss of 50-100 acres (20-40 ha) of habitat would have a negligible effect; however, depending on how clean mining personnel keep their food preparation and garbage facilities, there is a high probability of human/bear conflicts and the possibility of bear being shot in defense of life and property for the life of the project. Any loss of bear due to small scale placer activities would be expected to have a negligible impact on refuge bear populations.

The Service would require known bear denning areas be avoided by seismic and core drilling crews. Consequently, seismic surveying and core drilling activities would have a negligible effect on refuge bear populations.

Oil development in the southeast corner of the refuge would be expected to have a negligible impact on refuge bear populations as a whole; however, in the immediate area of the oil field, some bear would be displaced into adjoining habitats. Development of air and ground transportation systems, camp facilities, increased human presence, and noise from logistical support would cause bear to seek other, more remote habitats. Denning areas near the field may be abandoned due to disturbance during the construction and production phases and localized movements of bear in the area would be altered. Bear may avoid traditional feeding sites along the Porcupine and Coleen rivers, both of which have salmon runs and resident fish populations. This and other displacement impacts could result in increased competition in adjacent areas and possible lowered recruitment. Increased numbers of human/bear conflicts in the area of operation would result in some bear being killed in defense of life and property. The loss of bear and displacement of bear from this activity would be expected to have a minor, localized long-term impact on the refuge's bear population.

Overall, public and economic uses permitted in this alternative are expected to result in negligible changes in bear populations on a refuge-wide basis. Oil development could have a minor, localized impact on bears.

Furbearers

As discussed for Alternative A, public use levels in the Alternative B scenario would have negligible impacts on refuge furbearer populations.

Most furbearing species would be displaced into more remote, adjacent drainages during the spring and fall by the noise and human activity associated with timber harvest along the Porcupine River. The effect would be highly localized and of short duration. Creating 20 small clearcut areas per year with commercial timbering activities would have negligible impacts on refuge furbearer populations.

Furbearers would avoid the area around the placer mining site during operations. However, loss of 50 to 100 acres (20-40 ha) of habitat in the Christian River vicinity would have a negligible impact on refuge furbearers.

Seismic surveys, core drilling, and oil development as described in the scenario would have a negligible impact on refuge furbearer populations.

In summary, the public and economic uses in Alternative B would have a negligible effect on the refuge's furbearer populations.

Threatened and Endangered Species

The level of recreational use projected in the Alternative B scenario would not affect the refuge's threatened and endangered species, with the possible exception of arctic and peregrine falcons. The projected level of recreational use in this scenario would have the same potential impacts as described under Alternative A. As noted in the discussion under raptors, breeding raptors generally are very sensitive to disturbance. Reproductive success would be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers known to sustain peregrine nests at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor the peregrines and river use to ensure that impacts are avoided.

No threatened or endangered species are known to occur in the placer mining site in the scenario. Thus, this activity should have no effect on the refuge's threatened or endangered species.

The projected timber harvesting operation on the Porcupine River could affect American peregrine falcons that use the river. Before this activity would be permitted a Section 7 consultation would be required under the provisions of the Endangered Species Act. To avoid potential impacts, timber harvesting within known areas of traditional peregrine nesting would not be allowed.

Before the projected oil development at the confluence of the Porcupine and Colleen rivers could be permitted, a Section 7 consultation would be required under the provisions of the Endangered Species Act. The oil development in the scenario could adversely affect the refuge's American peregrine falcon population. As noted earlier under the discussion of raptors, aircraft used for transportation, heavy equipment operation during construction and production, and constant human activity associated with an oil field near the Porcupine River would disturb raptors such as peregrines and could cause them to avoid the entire area of operation. Traditional nesting and feeding perch sites probably would be abandoned as peregrines are displaced to other sites for the life of the field. If birds moved into less suitable, adjacent habitats, lowered reproductive success in the American peregrine falcon could adversely affect the population. Potential oil and gas activities described in the Alternative B scenario thus may have a moderate, long-term effect on the refuge's peregrine population.

Overall, Alternative B would have a negligible impact on most threatened and endangered species using the refuge. However, there is the potential for a moderate impact to the refuge's American peregrine falcon population if an oil development is established near the Porcupine River.

Water Quality and Quantity

The level of public use in Alternative B would have the same impacts on water quality as described for Alternative A. Minor, localized impacts to water quality could occur on popular rivers and lakes, particularly at regularly used campsites, due to improperly buried wastes. Refuge water quantities would not be affected.

Timber activities as described in the scenario would have a minor, short-term adverse effect on Porcupine River water quality immediately adjacent to clearcut sites, but effects on the river system would be negligible. Water quantity would not be altered.

Placer mining would have major long-term impacts on the water quality and quantity within the drainage where mining activities occurred. Mining could result in changes in water chemistry, such as dissolved oxygen and heavy metals concentrations, increased silt loads, and changes in the watershed's hydrologic regime. However, the small scale operation described in the scenario would have negligible impact on water quality and quantity in the refuge as a whole.

Seismic surveys and core drilling, conducted in the winter, would be expected to have a negligible effect on water quality and quantity, provided permit stipulations are followed.

Oil development in the Porcupine/Coleen area would have some adverse impacts on water quality in the localized area of operations. Construction of exploratory and production pads, production facilities, access roads, and other attendant features of the oil field would require land clearing, leveling, dredging, and filling, which in turn could increase soil compaction, soil erosion, surface runoff, and siltation of nearby waters. Surface and subsurface hydrological regimes could be altered or obstructed. Roads could result in stream constriction and siltation at waterway crossings; soil compaction from the roads or improper culvert placement could cause pooling along uphill sides of the roadbed. Water quality also could be affected by dust from road traffic, seepage of sanitation facilities, introduction of toxic drilling fluids, or accidental petrochemical spills. Water withdrawals for personnel and operations could deplete the area's streams and ponds and even alter the waters within the rivers during low water periods of the winter.

Overall, Alternative B would have a negligible effect on the refuge's water quality and quantity. In localized areas, however, placer mining and oil development could have minor to major, long-term impacts on water quality and quantity.

Air Quality

As with Alternative A, neither projected increases in recreational use nor surface geologic studies would significantly affect the refuge's air quality.

Small scale timber operations, placer mining, seismic surveying, and core drilling in the Porcupine area would have negligible effects on the refuge's air quality. The oil development could result in some air pollution. Air emissions would be generated by drilling, construction, excavation, vehicular

and air traffic, pipelines, electrical generation, natural gas flaring, and the central production facility. All sources of air pollution in the refuge must comply with applicable Environmental Protection Agency (EPA) and State of Alaska air pollution control requirements. It is expected that these requirements would be sufficient to ensure that there would be at most only a minor impact to air quality.

Ecosystems

Increasing public use described in Alternative B's scenario would have negligible impacts on refuge ecosystems and natural diversity.

Timber operations creating 20 one-acre clear cuts each year along the Porcupine River would have some minor impacts on riparian and aquatic ecosystems at each site, primarily through making habitats less suitable for some species (with the possible exception of moose and bear). However, the activity should have negligible effects on natural diversity in the Porcupine River area.

Placer mining would alter the immediate area surrounding the claim site, resulting in a moderate impact to local ecosystems. The impact of this use on natural diversity and ecosystems throughout the rest of the refuge would be negligible.

Seismic surveying and core drilling would have a negligible effect on the refuge's ecosystems and natural diversity.

Oil activities on the south side of the Brooks Range would have some impacts on the ecosystems of the Porcupine area. Surface disturbances in the area of operations would significantly alter the area's forested and mesic ecosystems, resulting in a moderate impact to local ecosystems. However, this activity is not expected to adversely affect the refuge's natural diversity or biological productivity--the effects of oil development would be highly localized and minor from a total ecosystem perspective.

Overall, this alternative's potential for altering natural processes and species diversity in Arctic Refuge would be minor.

Socioeconomic Effects of Alternative B (Life of the Plan - 15 Years)

Population

Alternative B has the highest potential of all the alternatives for affecting the population of the local communities, but the impact would be minor at most. The oil activity in this scenario could result in some minor short-term population increases in the area. The scenario assumes about 50 workers would be needed for core drilling operations, 20 workers for the seismic studies, 120 workers for the exploratory drilling operations, and 180 people for developing the production wells. Most of the workers required in the different phases of activity, excluding the production phase, would be in the area for a short period of time (primarily in winters over about an eight year time period). An additional 250 workers would be needed for about an eight month period to construct the pipeline.

Most of the workers employed would be from communities outside the area. With the exception of Fort Yukon, the populations of the communities would not be affected by the oil and gas activities in the scenario. Fort Yukon would experience some moderate, short-term population increases. The core drilling and seismic studies workers would be housed in Fort Yukon on a seasonal basis. The exploratory drilling and production workers would partly be housed in Fort Yukon, and partly housed on-site (while working), also on a seasonal basis. In addition, some people would likely move into the community to start support businesses for the oil and gas activities. Most of the above workers, however, would not, increase the permanent population of the community. After the production wells are brought into operation this seasonal impact would cease, as most of the workers would not stay in the area. Production phase workers would reside in Fort Yukon year-round, but because of the small number of personnel needed in the production phase only a minor impact to the population would be expected.

The increase in public use and the other economic activities in the Alternative B scenario would be expected to have a negligible effect on the local population. The expected increase in recreational use could result in a negligible population increase during the summer, but the effect on the permanent population would not be significant, the same as Alternative A. The commercial timber operation in the scenario would employ only four people at most, and they probably would be local residents. The mining operation would involve only two to three people on a seasonal basis.

The overall impact from the Alternative B scenario on the local population is expected to be negligible, with moderate short-term population increases expected in Fort Yukon.

Economy

The Alternative B scenario would have moderate economic impacts, primarily centered in Fort Yukon. Several hundred temporary jobs would be created during the course of exploring and producing oil in the refuge. Many of the workers employed probably would be from outside the area. Local businesses in Fort Yukon, such as restaurants, hotels, air charter services, and shipping, would likely increase their revenues from increased expenditures associated with the oil and gas activities. Additional jobs would be created in these support businesses. This economic stimulus would greatly subside, however, once the construction phase of the project has been completed and the wells are actually producing.

On a larger scale, the revenues generated from oil leasing arrangements and royalties, and expansion of support businesses in Fort Yukon would increase funds available to local, state, and federal governments.

The effects of the commercial timber operation and mining on the local economy would be negligible. The commercial timber operation would employ about four people on a seasonal basis, while the placer mine would employ 2 to 3 people. These operations would have a negligible positive benefit for the local economy, providing some benefits to other local businesses from their expenditures, and increasing the tax base for local and state governments.

The increase in recreational use would be expected to have a negligible positive effect on the local economy, the same as in the Alternative A scenario.

In summary, the Alternative B scenario would have a moderate, short-term, positive effect on the local economy, primarily in Fort Yukon from the projected oil and gas activities. The economic impacts from this alternative could be significant to a small number of people, but most local residents would not benefit economically.

Subsistence/Section 810(a) Evaluation and Finding

The Alternative B scenario assumes more economic uses than all of the other alternatives considered. As noted in the description of biological effects, oil development would have a minor, long-term impact on the Porcupine caribou herd. Caribou is a primary subsistence resource for Arctic Village, Kaktovik, Chalkyitsik, Fort Yukon, and Venetie residents. Even a minor change in the caribou herd could affect subsistence use of Arctic Village and Venetie residents. Some Fort Yukon and Chalkyitsik residents that travel up the Porcupine River tributaries to hunt moose and small game, and trap also may be displaced from the area of operations. Residents may or may not be able to find adequate game in other nearby areas.

The timber harvesting operation on the Porcupine River would have a localized, negligible effect on subsistence resources and users. Operations would occur only over a few months in the fall and spring. Some animals such as moose and caribou may be displaced to other areas as a result of this activity, but with adequate stipulations and monitoring, impacts to refuge resources, including subsistence resources, would be negligible. Local residents who hunt and trap in the area where the timber is harvested could be temporarily displaced, but residents probably would be able to find adequate fish and game in other nearby areas.

The mining operation near the Christian River would significantly affect refuge resources in the area of operations. Some subsistence species would be displaced from the area of operations. This area, however, is not heavily used by local residents for subsistence purposes. Local residents probably could find adequate resources in nearby areas.

The increase in recreational hunting and fishing in the Alternative B scenario is the same as assumed in the Alternative A scenario. Sport fishing is expected to continue to be a minor use of the refuge. Although the number of sport hunters is projected to increase by 43%, there still would be a relatively small number of sport hunters in the refuge, dispersed over a large area. Competition between local residents and recreational users for resources and campsites would increase in popular areas that have relatively good access, such as the Hulahula River and off the Dalton Highway. The expected increases in harvest levels resulting from the increase in recreational use would not be expected to adversely affect subsistence users. The Alaska Department of Fish and Game and the Service would monitor use levels to ensure that opportunities for subsistence harvests are maintained.

Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents probably would grow increasingly concerned in this scenario that more "outsiders" are intruding on their way of life, reducing opportunities for subsistence activities. In addition to the recreational users, in this alternative commercial timber operations, a mining operation, and oil development activities all would be occurring in the refuge. Many of the oil workers would probably hunt and fish in the refuge (outside of the area of operations). The miners also would harvest resources in the refuge. With more planes and boats in the refuge, and a higher potential for seeing people, local residents would likely become concerned that their subsistence way of life is being threatened.

Availability of Other Lands - As noted in the Section 810(a) evaluation for Alternative A, there may be other lands available for the uses considered, but lands outside of the refuge are not considered because they are beyond the scope of this plan. The Alternative B public use scenario focused on existing and potential popular recreational use areas. There are other areas within the refuge that could provide opportunities for similar use, but they have not been identified by the Service.

The developments considered in the scenario are all site-specific projects. Whether additional lands are available for the developments depends on the resources and the economics of developing a particular site. There are only a few active claims in the Arctic Refuge where a mine could be developed. Most of the refuge does not have areas where a commercial timber harvest operation would be economically feasible. The location of an oil production facility would depend largely on the location of the oil resource. Only the southeastern part of the refuge (south of the "1002" coastal plain area) is believed to have moderate potential for oil and gas. Within this area there could be other sites that could be developed for oil and gas.

Other Alternatives - Seven management alternatives were developed for the Arctic Refuge plan. Five of the alternatives do not provide for new economic uses in the refuge; two of the alternatives provide for new economic uses. Only Alternative B would provide for oil and gas leasing in the refuge. All of the alternatives would permit increased recreational use of the refuge if it is compatible with refuge purposes, although Alternative G would limit the increase to protect the refuge's existing wilderness values.

Findings - Under Alternative B the Service could permit additional public use and several economic developments, including oil and gas leasing (assuming Congress approved this use). The primary impact to subsistence in this alternative would occur from oil development. Oil development has the potential to result in minor long-term impacts to the Porcupine caribou herd--a key subsistence resource. The number of caribou Arctic Village and Venetie residents harvest probably would be reduced. This in turn could adversely affect some families who depend on subsistence activities. The commercial timber and mining operations also could displace some local residents from areas where they occasionally hunt and trap (although other nearby areas probably could be used for subsistence activities). The projected increase in public use would result in increased harvests of fish and game in the refuge, but the level of use would still be relatively low and

generally would not occur in the same areas or times subsistence harvests occur. Both the Service and the State of Alaska would ensure that opportunities for subsistence harvests are maintained.

The Service concludes that of all the alternatives considered, Alternative B has the highest potential to adversely affect local residents subsistence needs and uses of refuge resources. This alternative would generate the greatest concerns of local residents about impacts to their way of life. Although there are no specific proposals for oil and gas production south of the "1002" area, Alternative B has the potential to result in significant restrictions to some subsistence users, specifically to Arctic Village and Venetie residents, on the Arctic Refuge.

Recreation

Under the Alternative B scenario recreational use would increase the same as projected in the Alternative A scenario. Thus this alternative for the most part would have the same effect on recreational use as described for Alternative A. Most recreational use would continue to be in the existing popular areas for hunting, hiking, and river floating (e.g., Kongakut, Sheenjok, Hulahula rivers, Peters-Schrader lakes). The Service would continue to manage recreational use as it does now. No developments or facilities would be built to facilitate improved access or otherwise make recreational use easier or potentially more popular.

With recreational use projected to increase 72% by the year 2000, an increase in competition, perceived crowding, and other recreational user conflicts may occur in popular areas (although most of the refuge still will have relatively few users). In particular, some sheep hunters, hikers, and floaters seeking solitude may perceive the Atigun Gorge area, the Peters/Schrader lakes area, and the Hulahula and Kongakut drainages at times to be overcrowded. Conflicts between hunters and hikers are not expected because most hikers would not be using the same areas at the same time. In the future, increased competition for resources in the Atigun Gorge area may make it necessary for the Service to propose regulations to the Alaska Department of Fish and Game and the Board of Game to limit harvests or restrict specific uses.

This alternative would affect opportunities to hunt, fish, or pursue nonconsumptive uses in localized areas in the refuge. Specifically, the timber harvesting operation, mining operation, and oil development would eliminate or reduce opportunities to recreate in the areas of operation and adjacent areas. None of these areas, however, are popular recreational use areas. Although development of the placer mine near the Christian River in the scenario could displace recreational users, particularly those individuals seeking a wilderness experience, it is expected that this area would receive little, if any, recreational use. Thus, the mine would have a negligible effect on recreational use. The oil developments and commercial timber harvest operations in the Porcupine River area also would have a negligible effect on recreational use: the number of unguided float trips on the river would decrease from 12 float trips to 8 trips. The decrease would be expected because some groups seeking a primitive recreational experience would be displaced to other areas by the human activity (actual or perceived) in the area.

The oil development would bring in a large number of people during the construction phase. This in turn could increase for a short time the number of recreational users in the refuge, outside of the project area, but after construction is completed the level of recreational use would be expected to drop down to pre-construction levels.

Overall, Alternative B would have a minor effect on recreational use in the Arctic Refuge. In localized areas (i.e., Atigun Gorge, Hulahula and Kongakut river drainages) the projected increase in recreational use could result in some minor adverse impacts such as perceived overcrowding. The economic developments in the scenario would reduce or eliminate opportunities for recreational use in localized areas, but from a refuge-wide perspective, the developments would have a negligible effect on recreational use. A few recreational users seeking a primitive wilderness experience may be displaced from the Porcupine River.

Cultural Resources

The Service's management actions in this alternative would have a negligible effect on the refuge's cultural resources. Management studies and research would continue to be the primary fish and wildlife management activities occurring in the refuge. Such activities generally have only negligible impacts on cultural resources.

Some damage to sites may occur incidental to subsistence activities and increased recreational use levels. The highest potential for damage occurring would be at frequently used camping sites because of the possibility that these sites were used in the past.

The Alternative B scenario assumes commercial timber harvesting, mining, and oil exploration and development would occur in the southern part of the refuge. These activities have some potential to damage archaeological and historic sites. The timber harvesting operation along the Porcupine River could damage cultural sites when the timber is dragged over the river banks. The mining operation could damage the sites when areas are cleared for sluicing operations, and refuge lands that are excavated for settling ponds and other support facilities. Oil exploration and production facilities could damage cultural sites when refuge lands are excavated to construct drill pads, roads, pipelines, and other support facilities. Site-specific cultural resource inventories would be required prior to undertaking these economic uses to reduce the potential for impacts (although incidental damage could still occur at undetected sites).

In summary, the Alternative B scenario has the potential for incidental damage to cultural resources. However, potential damage would be avoided whenever and wherever possible by completing cultural resource inventories and evaluations, and through the use of mitigation or preservation measures. The Service would expect most impacts to be only negligible.

Wilderness Designation Effects of Alternative B (50 Years)

In Alternative B none of the refuge's 9.1 million acres (3.7 million ha) of non-wilderness lands would be proposed for wilderness designation. These lands would be included as minimal management, wild river management, moderate management, or intensive management areas during the life of the plan. The Service would manage lands in these categories as indicated in Table 10--all of the uses shown in the table that are compatible with refuge purposes could be permitted. With no additional wilderness designations, the Service would retain maximum flexibility in managing the non-wilderness lands in the future. Under this alternative the Service could develop areas for increased public use or economic uses that might not protect wilderness values, but would be compatible with refuge purposes.

Effects on Wilderness Values

1. Naturalness - Activities which would be allowed on the refuge under the Alternative B scenario, and which could affect naturalness, include recreational use, surface geologic studies, oil development, commercial timber harvesting, and mining. Recreational use in the Alternative B scenario is projected to increase by 72%, the same as Alternative A. The projected increase in recreational use in the Atigun Gorge thus would have the same effects on naturalness as those described for the Alternative A scenario. In the Atigun Gorge area increased littering, more primitive campsites, and the presence of obvious trails would be evident primarily near the river, affecting a total area of not more than one acre (0.4 ha). In the rest of the 10 million acres (4 million ha) south of the "1002" area and the existing Arctic Wilderness, recreational use is projected to be relatively light: at most 60 hikers, 300 floaters, and 150 hunters are projected to use this area. Even areas with good access, such as the Sheenjek River, probably would be visited by no more than 20 groups per year. This level of use would not be expected to result in measurable adverse impacts to naturalness.

The timber harvesting operation would affect the forests, and associated wildlife, along the upper Porcupine River banks for a small area. The scenario assumes twenty 1-acre irregular strips would be cut within 200 feet (61 m) of the river. Thus, small clearcut areas, totaling 20 acres (8 ha), would be created along the river banks. In these areas any large white spruce would be removed, which would increase the growth of shrubs and other deciduous plants in the understory. With reseeding, in 5 to 10 years the cut areas would be revegetated. Visual impacts, primarily signs of stumps and slash, would be limited to the river channel. Within 2 to 3 years understory and shrub vegetation would cover the cut areas, but it would be many decades before the spruce would appear as they were before the timber harvest. Noise impacts from chain saws and other machinery could temporarily displace large game animals (in the spring and fall) and raptors (in the spring) from an area not exceeding more than about 200 acres (81 ha) near the river. Some water quality impacts could occur due to increased siltation from dragging the logs over the river banks. (See also the description of the biological effects of Alternative B.)

The mining operation described in the scenario would alter the landscape of the refuge, including vegetation and fish and wildlife resources. The mining operation site, and the adjacent camp, tailing piles, settling ponds, roads, and air strip would remove all vegetation in an area covering a maximum of 100 acres (40 ha). Visual impacts would be limited to the area of operations. Noise impacts from machinery and motorized vehicles could displace or cause moose, bear, furbearers and other wildlife to avoid an area for a radius of half a mile (0.8 km) around the project site--about a 500 acre (200 ha) area would be affected. Major long-term impacts to fish and water quality and quantity could occur in the drainage where mining occurs (see the description of biological effects of Alternative B).

Surface geologic studies would have the same effects on the refuge resources as described for the Alternative A scenario: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple of hours.

Core drilling and seismic exploration could occur in numerous sites, primarily in the Porcupine Plateau. Nine seismic lines would be run for an estimated 135 miles (220 km) through the refuge. All drilling and seismic tests would be done in the winter. At each test point disturbance from helicopters and the presence of people would affect at most one acre (0.4 ha) for less than a day. Up to 4,900 acres (2,000 ha) could be affected by this activity. Other than some removal of vegetation and the presence of piles of dirt, there would be no visible effect of the activity. The noise of the helicopter could disturb wildlife, but because the activities would be carried out in the winter impacts would be negligible.

Oil development activities would substantially affect the Porcupine/Coleen area. Developing an oil production facility as described in the scenario would totally alter the area of operations due to surface disturbance and the presence of facilities and people--drilling pads, worker camp, airstrip, roads, storage facilities, etc. would eliminate or substantially modify the vegetation and wildlife in an area covering 500 acres (200 ha) over the long-term. Noise of machinery and the presence of people would also cause game species to move away or avoid the area, up to a radius of a mile (2 km) from the center of the project site--about a 2,000 acre (800 ha) area would be affected. In addition, the main pipeline and service road in the scenario would affect an estimated 10 miles (16 km) of the refuge: vegetation would be cleared for about 36 acres (15 ha) in the 50-foot (6-m) right-of-way and then replanted after construction. Approximately 5 acres per mile would be directly impacted by construction of the pipeline and road, affecting the vegetation covering up to 50 acres (20 ha). The construction and maintenance of the pipeline also would displace wildlife, affecting the naturalness of an area extending one half mile in either direction from the right-of-way--up to 13,000 acres (5,000 ha) could be affected. The effect of all these oil development activities, described under the "Biological Effects of Alternative B," would include major localized long-term impacts to vegetation, moderate localized long-term impacts to fish, raptors, and wintering caribou, and minor to major impacts to water quality in the area of operations. Visual impacts would be limited to the area of operations and the pipeline corridor.

2. Outstanding Opportunities for Solitude - The projected increase in public use in Alternative B would have the same effect on opportunities for solitude as described for Alternative A. In the Atigun Gorge area the chances of seeing another group would be highest during the first week of hunting, the peak use period. The chances of seeing another group would increase about 160% relative to current use levels, particularly along the route into the gorge and the campsites along the river--the areas most likely where other groups would be seen. During the rest of the year, and outside of the first week of hunting, there would not be many groups in the area and therefore a low probability of seeing or hearing other people. In the rest of the refuge, south of the existing Arctic Wilderness and the "1002" area, public use is projected to be relatively light--about 510 recreational users. Public use would be expected to occur primarily in areas with good access, such as the Sheenjek and Porcupine rivers. All of the areas probably would be visited by no more than 20 groups, spread out over the summer and early fall. With this low level of use, most groups would not see or hear other groups in the same area.

The commercial timber operation would take place along the Porcupine River during the spring and fall, to minimize impacts to the soil from hauling the timber to the water. Noise from the operation could affect about a 200 acre (80 ha) area. At other times of the year, there would be no impact on solitude from this use--river floaters would not be affected by the operation because they would be on the river in the summer, when no timber harvesting would be occurring.

The mining operation would require 2 to 3 people working the site in the summer. Visual impacts of the operation would cover a maximum of 100 acres (40 ha). Noise from the machinery could be heard no more than 9 square miles (23 km²) from the mining site--up to 5,800 acres (2,300 ha) could be impacted. The mining operation would be expected to have a negligible effect on refuge users, however, because the site is not located in a popular recreational use area.

Oil and gas studies (including geological mapping, core drilling, and seismic surveys) would occur primarily in the Porcupine Plateau in this scenario. The studies would involve a maximum of 50 people and several helicopters and snowmachines, spread out over the refuge. Although numerous sites would be visited, the 3 to 4 person crews would only be seen at any given site for a maximum of a day. The probability of other refuge users seeing or hearing these crews would be very low because the studies would primarily occur during the winter, when few if any recreational users would be present.

Oil exploration and development as described in the scenario would cover a 500 acre (200 ha) area, plus a 10-mile (16-km) pipeline corridor and service road in the refuge. No visitors could come into this area without seeing people, facilities, pipelines, roads, drill pads, storage areas, etc. In addition, noise from motorized equipment could be heard for a mile radius from the center of the area of operations--opportunities for solitude would be diminished in an area up to 2,000 acres (800 ha). Noise from construction of the main pipeline and service road would affect an area extending one half mile on either side of the right-of-way--opportunities for solitude would be diminished in up to 13,000 acres (5,200 ha). Impacts during the construction

phase, lasting no more than 3 years, would be more severe than during the production phase--although the visual impacts would be the same in both phases, during the production phase noise would be much lower in the area of operations and the pipeline corridor, primarily aircraft accessing the site. The number of workers on site would drop from approximately 180 to less than 10. Recreational visitors would not likely see or hear the oil development in the scenario because few users would be expected to visit this area--only float groups on the Porcupine River may be affected for a relatively short distance (less than 7 river miles (11 km)) by the development.

3. Outstanding Opportunities for Primitive Recreation - The projected increase in recreational use would have the same effects on opportunities for primitive recreation as described for the Alternative A scenario. The increase in use in the Atigun Gorge would lower the quality of the recreational experience in this area, relative to the rest of the refuge that receives little use--the potential for encountering litter, campsites, trails, and other groups would be higher in the Atigun Gorge, which could adversely affect those seeking a pristine wilderness experience. However, visitors would continue to be able to recreate in an outstanding primitive setting, with no visitor services or facilities, in this area. In the rest of the refuge the projected recreational use level would not affect opportunities for primitive recreation.

The commercial timber harvesting operation would occur for only a few weeks during the spring and fall when few, if any, recreational users would be present. If a visitor were present during this time he or she would still have a primitive recreational experience (e.g., no visitor services or facilities), but the visual impacts and noise of the operation, and the temporary avoidance of this area by game animals would reduce the quality of the experience.

The mining operation in the scenario is not located at a site known to have outstanding primitive recreation qualities--few if any visitors would be expected to come to this area. If recreational users were to come to this area the mining operation would eliminate opportunities for primitive recreation within the project drainage, covering a maximum of 100 acres (40 ha). In a 9-square-mile (23-km²) area around the mining site, covering 5,800 acres (2,300 ha), visitors could continue to find opportunities for primitive recreation, but noise from the operation and the displacement of game animals from this area would reduce the quality of the experience.

Seismic surveys and core drilling would occur primarily during the winter and any impacts would be limited to small, localized areas--up to 4,900 acres (2,000 ha) could be affected by this activity. Few, if any, recreational users would be in the refuge during the time when these studies occurred. If visitors were present during the winter near seismic surveying or core drilling sites, they could have a primitive recreational experience, but the quality of the experience would be reduced.

The oil development in the scenario also is not in an area expected to be a popular recreational use area. If river floaters or other recreational users come to this area they would find all opportunities for primitive recreation eliminated in the area of operations--a 500-acre (200-ha) area. For another mile radius around the development (2,000 acres or 800 ha) and for a half mile on either side of the pipeline right-of-way (13,000 acres or 5,200 ha) opportunities for primitive recreation would be available, but noise from the development (e.g., machinery, aircraft) and displacement of game animals in this area during the construction period would lower the quality of the experience.

4. Special Features - The Arctic Refuge has many special features, including the Wind, Ivishak and Sheenjek wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, Porcupine Lake, Old John Lake, the ramparts of the Porcupine River, and the upper Coleen River.

The projected increase in public use in the Alternative B scenario would have the same effects on special features as described for Alternative A. Public use in the refuge would be expected to be concentrated in only a few popular areas with good access, such as the Atigun Gorge. The increase in hunters and hikers generally would not be expected to affect the scenic/geologic and wildlife features in the Atigun Gorge area. (One resource that may be adversely affected is the local sheep population. As noted under the Alternative A scenario the effect of the projected level of hunters on the local population is unknown.) Most other areas with special features probably would be visited by no more than 20 groups per year, which should not result in adverse impacts to the special features. The projected increase in sport hunting in the refuge would result in additional caribou being harvested, but the Porcupine caribou herd should sustain this harvest with no measurable effect.

Seismic surveys and core drilling on the Porcupine Plateau in this scenario would not occur in areas that are known special features of the refuge. The survey lines would be routed to avoid known wintering caribou concentration areas. Any impacts to caribou from these activities would be of very short duration (less than a day) and the animals could move to adjacent areas.

Neither the logging or the mining developments in the scenario would be in areas that are special features of the refuge. The mining operation would have a negligible effect on the Porcupine caribou herd, as caribou would not be present on the mining site when most of the mining activity would occur. The logging operation also would have a negligible impact on the Porcupine caribou herd: a few animals may be disturbed by this operation in the spring and move to other nearby areas. The oil development could displace wintering caribou to surrounding areas (see the "Biological Effects of Alternative B"). This impact, however, would have only a minor overall impact on the refuge's population.

Conclusion - The management actions in the Alternative B scenario would not affect most of the wilderness values in the 10 million acres (4 million ha) south of the "1002" area and the existing Arctic Wilderness--naturalness, solitude, opportunities for primitive recreation, and special features of the refuge generally would be maintained in over 95% of the refuge for the

foreseeable future in this alternative. In certain areas, however, wilderness values would be diminished or lost. The increase in public use could adversely affect naturalness, and opportunities for solitude in the Atigun Gorge (which also is one of the refuge's special features), in a cumulative area totaling one acre along the river during the first week of the hunting season. The placer mine in the scenario would eliminate perceived naturalness, solitude, and opportunities for primitive recreation in a 100-acre (40-ha) area, and reduce opportunities for solitude and the quality of the recreational experience in another surrounding area totaling no more than 5,800 acres (2,300 ha). The commercial timber harvesting operation would affect the naturalness of the riparian lands along the Porcupine River, totaling 200 acres (80 ha), but should not affect other wilderness values. Seismic surveys and core drilling could temporarily disturb the vegetative cover and displace wildlife, affecting the naturalness of up to 4,900 acres (2,000 ha). The oil development in the scenario would adversely affect the wilderness values of naturalness, solitude, and opportunities for primitive recreation in an area totaling about 2,000 acres (800 ha), while the pipeline corridor and service road would affect the naturalness and opportunities for solitude in less than 13,000 acres (5,000 ha). It should be noted that none of the economic developments in the scenario are in popular recreational areas, so the impacts to most users would be negligible. The Alternative B scenario would not adversely affect most of the special features of the refuge.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

Alternative B would not propose any additional areas for wilderness designation. Oil and gas studies could occur on all of the refuge lands south of the "1002" area; in the Arctic Wilderness and wild river corridors limited oil and gas studies could occur. The Alternative B scenario assumes that surface geologic studies, seismic surveys, core drilling, and exploratory drilling would occur on the Porcupine Plateau. The scenario further assumes that oil and gas production would occur in moderate and intensive management areas in this alternative (assuming Congress approves this use).

Conclusion - The Alternative B wilderness proposal (i.e., no additional wilderness) would have no effect on the level of oil and gas activities in the refuge.

Effects on the Level of Mining Development

There are nine active mining claims in the Arctic Refuge. Mining of valid claims could occur throughout the refuge under Section 304(c) of the Alaska Lands Act. On all of the claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative B. With no new wilderness proposed under this alternative, the Service would take no actions in this alternative that would affect mining activity on the refuge.

Conclusion - The Alternative B wilderness proposal would have no effect on the level of mining in the refuge.

Effects on the Level of Commercial Timber Harvesting

Alternative B would not propose any additional areas for wilderness designation. Additionally, commercial timber harvesting could be permitted in moderate and intensive management areas, provided it is compatible with refuge purposes.

Conclusion - The Alternative B wilderness proposal would have no effect on the level of commercial timber harvesting operations in the refuge.

ALTERNATIVE C

The scenarios developed for Alternative C assume limited economic development (i.e., hardrock mining and commercial timber harvesting) would occur on refuge lands on the south side of the Brooks Range. The Alternative C scenario projects current public use levels into the future assuming more people seeking a wilderness experience continue to be attracted to the refuge (and not because of any actions the Service takes); the remoteness and high cost of reaching the refuge, however, would limit the expected increase in public use.

Public Use Scenario

In the Alternative C scenario the Service would continue to manage public use in the refuge as it has in the past. All of the assumptions described for the Alternative A scenario (e.g., popular use areas, proportions of different recreational uses, seasons and bag limits) would be the same for this scenario. Thus, the recreational use levels in the Alternative C scenario would be the same as described in the Alternative A scenario.

In the Alternative C scenario aircraft access would not be limited. It is assumed in this scenario that the aircraft use levels in the Firth River-Mancha Creek area would be the same as in the Alternative A scenario.

Development Scenario

In the Alternative C scenario two types of economic development would occur on refuge lands in the year 2000: commercial timber logging and hardrock mining. Oil and gas exploratory drilling and development would not occur in this scenario (see below).

Commercial Timber Operation

Under Alternative C commercial timber operations could occur in the moderate management areas south of the Brooks Range. The Alternative C scenario assumes a small, local commercial timber operation would occur on refuge lands along the Porcupine River. The scenario for this operation, including the development assumptions, is the same as described in the Alternative B scenario.

Mining

The Alternative C scenario assumes that a placer mining operation for gold recovery would be developed on refuge lands near the Christian River. The mining scenario for this operation, including the development assumptions, is the same as described in the Alternative B scenario.

Oil and Gas Activities

In Alternative C, geologic studies, including surface rock collection, gravimetric surveying and geological mapping activities, could be permitted on a site-specific basis throughout the refuge. Seismic surveying and core drilling, oil and gas studies involving the use of motorized equipment, could be permitted south of the existing Arctic Wilderness and the "1002" area.

Limited oil and gas studies could be permitted in the wilderness area. Under Section 1003 of the Alaska Lands Act, all of the Arctic Refuge is closed to oil and gas leasing and production. For the purposes of analysis it is assumed that oil and gas leasing and production would continue to be prohibited south of the "1002" area. The scenario assumes that seismic studies and core drilling would not occur during the life of the plan because of the expense involved in field work and the likelihood that companies would conduct these studies only on lands available for oil and gas development. In the scenario only surface geologic studies would occur south of the "1002" area, on the Porcupine Plateau. The assumptions for surface geologic studies would be the same as described in the Alternative A scenario.

Biological Effects of Alternative C (Life of the Plan - 15 Years)

Vegetation

Increasing levels of public use described in the scenario would have the same negligible impacts on vegetation as described for Alternative A. Surface geologic studies also would have a negligible effect on vegetation.

Small scale timber activities described in the scenario for Alternative C would result in the same minor, highly localized changes in vegetation as described under Alternative B. Overall, these small scale timber activities would have a minor, localized effect on the Porcupine River riparian vegetation, but refuge-wide, the impact would be negligible.

Placer mining activities as described in Alternative C's scenario would have the same effects as described for the Alternative B scenario: major, long-term impacts would be anticipated for the vegetation in the entire drainage where the claim is sited.

In summary, most of the permitted activities under Alternative C would have a negligible impact on the refuge's vegetation. Mining would result in a major long-term alteration of the mining site's vegetation, but from a refuge-wide perspective impacts on refuge vegetation would be negligible.

Fish

As discussed in Alternative A, the projected increase in public use would have a negligible impact on the refuge fisheries resources.

The logging operation in the Alternative C scenario would have the same effects on fish as described for the Alternative A scenario. Overall, the small-scale timbering would have a negligible impact on Porcupine River fish populations.

Placer mining along a small tributary of the Christian River would have the same adverse effects on aquatic habitat and fish populations in the project drainage as described for the Alternative B scenario. Mining would have a major, long-term adverse impact on local fish populations. Because of the relatively small size of mining activities in the scenario, however, the effect of mining on refuge fish populations would be negligible.

Surface geologic studies would not affect refuge fish populations.

Overall, Alternative C would have a negligible effect on the refuge's fish populations, with major, long-term impacts in localized areas if mining occurs.

Waterfowl

Because increases in public use of Arctic Refuge in this alternative would be almost identical to use levels described for Alternative A, impacts on refuge waterfowl populations would be negligible.

The small timber operation and mining operation described in the scenario would have the same effect on waterfowl as noted for the Alternative B scenario: these developments would have a negligible effect on refuge waterfowl.

Surface geologic studies would not measurably affect the refuge's waterfowl population.

In summary, the increases in public use, the logging and mining operations, and surface geologic studies in the Alternative C scenario would have a negligible effect on the refuge's waterfowl populations.

Shorebirds

The projected increase in public use would have a negligible impact on refuge shorebirds.

The economic uses described in the scenario would have a negligible impact on shorebirds. Very few shorebirds move through the riparian areas where small-scale timbering would take place; timber harvest activities described in the Alternative C scenario would result in a negligible impact to refuge shorebirds. Placer mining in Alternative C would have a negligible effect on refuge shorebird populations, as few shorebirds use the area noted in the scenario. Surface geologic studies would not affect the refuge's shorebird populations.

In summary, Alternative C would have a negligible effect on the refuge's shorebird populations.

Raptors

As discussed under Alternative A, increasing public use, particularly along rivers, could have a minor impact on refuge raptors. The scenario for Alternative C is the same for float parties using the Porcupine River, where raptor nesting concentrations are high. Thus, disturbance impacts on raptors would be the same as in Alternative A: the net potential impact on refuge raptor populations would be minor.

The commercial timber operation along the Porcupine River would have the same effects on raptors as described under Alternative B. Timber harvesting during nesting could have a moderate localized impact on refuge raptor populations.

The placer mining operation effect on raptors would be the same as described under Alternative B: raptors would be likely to avoid the area while mining activities are taking place, but the effects would be minor and limited to the watershed being mined.

Surface geologic studies would have a negligible effect on the refuge's raptors.

Overall, the increase in public use, and the commercial timber and mining operations described in the Alternative C scenario would have a minor effect on the refuge's overall raptor populations, with the potential for moderate localized impacts in the Porcupine River area.

Marine Mammals

Increased levels of public use described in the scenario for Alternative C would have negligible impacts on marine mammals within Arctic Refuge.

No marine mammals occur in the area being considered for timber harvesting, placer mining or surface geologic studies. Therefore, these economic uses would have no impact on refuge marine mammal populations.

Caribou

The increases in public use and surface geologic studies in this scenario, the same as noted under Alternative A, are not expected to measurably affect the refuge's caribou populations.

The timber operation in the Alternative C scenario would have the same impacts on the Porcupine caribou herd as described for the Alternative B scenario. Overall, small-scale timber operations would have only very minor, short-term impact on caribou.

Caribou would not be present in large numbers at the placer mining site near the Christian River when most of the mining activity would occur. Wintering caribou would simply avoid the areas where structures are placed and areas stripped of vegetation and would probably migrate around the site. Thus, placer mining activities in the Alternative B scenario would be expected to have a negligible impact on caribou.

From a refuge-wide perspective, Alternative C would have a negligible effect on the refuge's caribou population.

Moose

Impacts of increasing public use within the refuge would be negligible for moose, similar to Alternative A.

The commercial timber operation would have the same effects on moose as described under the Alternative B scenario: the small timber operation would have a slight long-term beneficial effect on moose in the the Porcupine River area; however, refuge-wide, timber activities would have a negligible impact on moose.

The impacts of the placer mining operation in this scenario would be the same as described under the Alternative B scenario. Overall, placer mining would have negligible impacts on refuge moose populations.

Surface geologic studies would have a negligible effect on moose.

In summary, the increase in public use and the commercial timber and mining operations in the Alternative B scenario would have a negligible impact on the refuge's moose population.

Dall Sheep

The level of public use in Alternative C would have the same effect on Dall sheep as Alternative A: although increased numbers of guided and unguided hunters would harvest more Dall sheep in the refuge, the effects of this harvest would be expected to have negligible impacts on the refuge's sheep population.

Dall sheep do not occur in the area where timber harvesting, placer mining, or oil and gas studies are assumed in the scenario. Thus, these economic uses would have no effect on the refuge's Dall sheep population. Surface geologic studies also would not be expected to affect the refuge's sheep population.

In summary, Alternative C would have a negligible effect on the refuge's Dall sheep population.

Muskox

Alternative C's scenario does not appreciably increase public use levels beyond those described for Alternatives A and B. Therefore, Alternative C would have the same negligible impact on refuge muskox.

Muskox do not occur in the area where timber harvesting, placer mining, or oil and gas studies are assumed in the scenario. Thus, these economic uses would have no effect on the refuge's muskox population. Surface geologic studies also would have no effect on muskox.

From a refuge-wide perspective, Alternative C would have a negligible effect on the refuge's muskox population.

Brown and Black Bear

Increased levels of public use, and surface geologic studies in Alternative C would have the same negligible impact on bear as discussed in Alternative A.

During timber cutting activities, bear would avoid the Porcupine River riparian areas, but displacement would be temporary. Clear cut areas, with increased shrub and deciduous vegetation as a result of altered plant successional stages, could provide additional fall food for bear and additional cover, which is preferred by black bear in particular.

The placer mining operation would have the same effect on bear as the Alternative B scenario: the operation would be expected to have a negligible impact on refuge bear populations.

Surface geologic studies would have no effect on refuge bear populations.

Overall, the increase in public use and the commercial timber and mining operations in Alternative C would have a negligible effect on the refuge's bear populations.

Furbearers

As discussed for Alternative A, public use levels in the Alternative C scenario would have negligible impacts on refuge furbearer populations.

The timber operation in this alternative would have the same effects on furbearers as those described under the Alternative B scenario: a highly localized, short-term impact on populations in the project area, and a negligible impact on refuge furbearer populations.

Furbearers would avoid the area around the placer mining site during operations. However, loss of 50-100 acres (20-40 ha) of habitat in the Christian River vicinity would have a negligible impact on refuge furbearers.

Surface geologic studies in the scenario would have a negligible impact on refuge furbearer populations.

In summary, the increase in public use and the commercial timber and mining operations in Alternative C would have a negligible effect on the refuge's furbearer populations.

Threatened and Endangered Species

The level of recreational use projected in the Alternative C scenario would not affect the refuge's threatened and endangered species, with the possible exception of arctic and peregrine falcons. The American peregrine falcon nests on the Porcupine River cliffs, and the arctic peregrine falcon may nest on rivers on the north slope which refuge users float. The projected level of recreational use in this scenario would have the same potential impacts as described under Alternative A. Breeding raptors generally are very sensitive to disturbance. Reproductive success could be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs would be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers known to sustain peregrine nests at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor the peregrines and river use to ensure that impacts are avoided.

No threatened or endangered species are known to occur in the placer mining site in the scenario. Thus, this activity should have no effect on the refuge's threatened or endangered species.

The projected timber harvesting operation on the Porcupine River could affect American peregrine falcons that use the river. Before this activity would be permitted a Section 7 consultation would be required under the provisions of the Endangered Species Act. To avoid potential impacts, timber activities within known areas of traditional peregrine nesting would not be allowed.

Water Quality and Quantity

The level of public use in Alternative C would have the same impacts on water quality as described for Alternative A. Minor, localized impacts to water quality could occur on popular rivers and lakes, particularly at regularly used campsites, due to improperly buried wastes. Refuge water quantities would not be affected.

Timber activities in the scenario would have the same effect as noted for the Alternative B scenario: a minor short-term adverse effect on Porcupine River water quality immediately adjacent to clearcut sites, but a negligible effect on the river system. Water quantity would not be altered.

Placer mining under this alternative would have the same impacts as described under the Alternative B scenario: major long-term impacts on the water quality and quantity within the drainage where mining activities occurred. The small scale operation, however, would have a negligible impact on water quality and quantity in the refuge as a whole.

Surface geologic studies would not affect either refuge water quality or quantity.

In summary, Alternative C would have a negligible effect on the refuge's overall water quality and quantity, with minor to major localized impacts possible due to increased public use, mining, and timber harvest operations.

Air Quality

As with Alternative A, neither projected increases in recreational use nor surface geologic studies would affect the refuge's air quality. Small scale timber operations and placer mining would have negligible effects on air quality. Thus, the alternative would have a negligible effect on the refuge's air quality.

Ecosystems

Increasing public use described in Alternative C's scenario would have a negligible impact on refuge ecosystems and natural diversity.

The economic developments in the scenario would have the same effects on ecosystems as described for the Alternative B scenario. Timber operations would have some minor impacts on riparian and aquatic ecosystems at each site, but should have negligible effects on natural diversity in the Porcupine River area. Placer mining would have a moderate impact on ecosystems in the immediate area surrounding the claim site, but would have a negligible impact on natural diversity and ecosystems throughout the rest of the refuge.

Surface geologic studies would have a negligible effect on the refuge's ecosystems and natural diversity.

In summary, the timber harvest operation and mining operation in the Alternative C scenario could adversely affect refuge ecosystems on a localized basis. Overall, however, the alternative would have a negligible effect on the refuge's natural processes and species diversity in Arctic Refuge.

Socioeconomic Effects of Alternative C (Life of the Plan - 15 Years)

Population

The increase in public use, surface geologic studies, and the commercial timber and mining operations in the Alternative C scenario would be expected to have the same effect on the local population as Alternative A: a negligible impact.

Economy

The increase in recreational use and surface geologic studies in this scenario would be expected to have a negligible positive effect on the local economy, the same as in the Alternative A scenario.

The effects of the commercial timber operation and mining on the local economy would be negligible, the same as described for the Alternative B scenario.

In summary, the Alternative C scenario would have a negligible positive effect on the local economy.

Subsistence/Section 810(a) Evaluation and Finding

This scenario would not affect the subsistence needs of local residents. Subsistence activities would continue to be an important part of many local residents' lives.

The level of development (and the timing and management stipulations) and the level of public use described in the scenario would be expected to result in a negligible to minor effect on the refuge's fish and wildlife populations--subsistence species populations would not be expected to change appreciably as a result of the uses assumed in the scenario (although some animals may be displaced to other areas by the developments in the scenario). The subsistence activities of most local residents therefore would not be significantly affected by these uses.

The timber harvesting operation on the Porcupine River would have a negligible, localized effect on subsistence resources and users. Operations would occur only over a few months in the fall and spring. Some animals such as moose and caribou may be displaced to other areas as a result of this activity, but with adequate stipulations and monitoring impacts to refuge resources, including subsistence resources, would be negligible. Some Fort Yukon and Chalkyitsik residents that travel up the Porcupine River to hunt and trap where the timber is harvested could be temporarily displaced. Residents may or may not be able to find adequate fish and game in other nearby areas.

The mining operation near the Christian River would significantly affect refuge resources in the area of operations. Some game animals would be displaced from the area of operations. This area, however, is not heavily used by local residents for subsistence purposes. Local residents probably could find adequate resources in nearby areas.

The increase in recreational hunting and fishing in the Alternative C scenario is the same as assumed in the Alternative A scenario. The Alternative C public use scenario thus would have the same effect on subsistence as noted for the other scenarios. Competition between local residents and recreational users for resources could increase in popular areas that have relatively good access, such as the Hulahula River. The expected increases in harvest levels resulting from the increase in recreational use would not be expected to adversely affect subsistence users--the Alaska Department of Fish and Game and the Service would monitor use levels to ensure that opportunities for subsistence harvests are maintained.

The most significant adverse impact of the Alternative C scenario probably would be the perception of Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents that more "outsiders" are intruding on their way of life, reducing opportunities for subsistence activities. In addition to the recreational users, in this alternative commercial timber operations, a mining operation, and surface geologic studies all would be occurring in the refuge. More planes and boats in the refuge, increased potential for seeing people, and increased crowding in localized areas would all likely heighten concerns of local residents that their subsistence way of life is being threatened.

Availability of Other Lands - As noted in the Section 810(a) evaluation for Alternative A, there may be other lands available for the uses considered, but lands outside of the refuge are not considered because they are beyond the scope of this plan. The Alternative C public use scenario focused on existing and potential popular recreational use areas. There are other areas within the refuge that could provide opportunities for similar use, but they have not been identified by the Service.

The developments considered in the scenario are all site-specific projects. Whether additional lands are available for the developments depends on the resources and the economics of developing a particular site. There are only a few active claims in the Arctic Refuge where a mine could be developed. Most of the refuge does not have areas where a commercial timber harvest operation would be economically feasible.

Other Alternatives - Seven management alternatives were developed for the Arctic Refuge plan. Five of the alternatives do not provide for new economic uses in the refuge; two of the alternatives provide for new economic uses. All of the alternatives would permit increased recreational use of the refuge if it is compatible with refuge purposes, although Alternative C would limit the increase to protect the refuge's existing wilderness values.

Findings - Under the Alternative C scenario additional public use and commercial timber and mining operations are projected to occur on the refuge. Concerns of local residents about impacts to their way of life may intensify with these uses. All of the potential impacts that would result from the Alternative C scenario would be localized. None of the projected uses in the

scenario would adversely affect subsistence fish and wildlife population levels, although some negligible to minor impacts could occur (e.g., wildlife may be displaced in the areas where developments are located). The small commercial timber and mining operations could displace some local residents from areas where they occasionally hunt and trap, but other nearby areas probably could be used for subsistence activities. Increased harvest levels would occur with the increase in sport hunting and fishing, but sufficient resources would be available to meet subsistence user needs. It also should be noted that both the Service and the State of Alaska would take steps to ensure that opportunities for subsistence harvests are maintained. The Service thus concludes that Alternative C would not result in significant restrictions to subsistence uses on the Arctic Refuge.

Recreation

Under the Alternative C scenario recreational use would increase the same as projected in the Alternative A scenario. Thus this alternative generally would have the same effect on recreational use as described for Alternative A. Alternative C would not affect most opportunities to hunt, fish, or pursue nonconsumptive uses in the refuge. The projected increase in use may result in increased competition, perceived crowding, and other recreational user conflicts in popular areas. In particular, some sheep hunters, hikers and floaters seeking solitude may perceive the Atigun Gorge area, the Peters/Schrader lakes area, and the Hulahula and Kongakut drainages at times to be overcrowded. In the future, increased competition for resources in the Atigun Gorge area may make it necessary for the Service to propose regulations to the Alaska Department of Fish and Game and the Board of Game to limit harvests or restrict specific uses.

Although development of the placer mine near the Christian River in the scenario could displace recreational users, particularly those individuals seeking a wilderness experience, it is expected that this area would receive little, if any, recreational use. Thus, the mine would have a negligible effect on recreational use.

The commercial timber harvest operations along the Porcupine River would not be expected to affect the number of float trips. The timber cutting would occur in the spring and fall when most groups would not be floating the river. The timber cuts also would be relatively small, and should not affect groups seeking a primitive recreational experience in this area.

Surface geologic studies would not be expected to affect refuge recreational use.

Overall, Alternative C would have a negligible effect on recreational use in the Arctic Refuge. In localized areas (i.e., Atigun Gorge, Hulahula and Kongakut drainages) the projected increase in recreational use could result in some minor adverse impacts such as perceived overcrowding.

Cultural Resources

Alternative C would have the same effect on cultural resources as Alternative B. Some damage to sites may occur incidental to subsistence activities and increased recreational use levels. The highest potential for damage occurring would be at frequently used camping sites because of the possibility that these sites were used in the past.

The Alternative C scenario assumes commercial timber harvesting, mining, and surface geologic studies would occur in the southern part of the refuge. Surface geologic studies would not be expected to affect archaeological and historic sites. The timber harvesting operation along the Porcupine River could damage cultural sites when the timber is dragged over the river banks. The mining operation could damage the sites when areas are cleared for sluicing operations, and refuge lands that are excavated for settling ponds and other support facilities. Site-specific cultural resource inventories would be required prior to undertaking these economic uses to reduce the potential for impacts (although incidental damage could still occur at undetected sites).

In summary, Alternative C would have a negligible impact on cultural resources. Although the Alternative C scenario has the potential for incidental damage to cultural resources, potential damage would be avoided whenever and wherever possible by completing cultural resource inventories and evaluations, and through the use of mitigation or preservation measures.

Wilderness Designation Effects of Alternative C (50 Years)

In Alternative C none of the refuge's 9.1 million acres (3.7 million ha) of non-wilderness lands would be proposed for wilderness designation. These lands would be included as either minimal management, wild river management, or moderate management areas during the life of the plan. The Service would manage lands in these categories as indicated in Table 10--all of the uses shown in the table that are compatible with refuge purposes could be permitted. With no additional wilderness designations, the Service would retain maximum flexibility in managing the non-wilderness lands in the future. Under this alternative the Service could develop areas for increased public use or economic developments that might not protect wilderness values, but would be compatible with refuge purposes.

Effects on Wilderness Values

1. Naturalness - Activities which would be allowed on the refuge under the Alternative C scenario, and which could affect naturalness, include recreational use, surface geologic studies, commercial timber harvesting, and mining. The increase in public use, the surface geologic studies, and the commercial timber and mining operations in the Alternative C scenario are the same as described under the Alternative B scenario, and thus would have the same effects on the refuge's naturalness. The projected increase in public use in the Atigun Gorge area would be expected to result in increased littering, more campsites, and the presence of obvious trails, affecting a total area of not more than one acre (0.4 ha). In the rest of the 10 million acres (4 million ha) south of the "1002" area and the existing Arctic

Wilderness, recreational use is projected to be relatively light: at most 60 hikers, 300 floaters, and 150 hunters are projected to use this area. Even areas with good access, such as the Sheenjek River, probably would be visited by no more than 20 groups per year. This level of use would not be expected to result in measurable adverse impacts to naturalness.

The timber harvesting operation would have the same effects on the Porcupine River riparian area as described for the Alternative B scenario. Small clearcut areas, totaling 20 acres (8 ha), would be temporarily created along the river banks. Visual impacts, primarily signs of stumps and slash, would be limited to the river channel. Within 2 to 3 years understory and shrub vegetation would cover the cut areas, but it would be many decades before the spruce would appear as they were before the timber harvest. Noise impacts could temporarily displace large game animals (in the spring and fall) and raptors (in the spring) from an area not exceeding more than about 200 acres (81 ha) adjacent to the river. (See also the description of the biological effects of Alternative B.)

The mining operation in the scenario would have the same effects on the landscape of the refuge as those noted under the Alternative B scenario. The mining operation would remove all vegetation in an area covering a maximum of 100 acres (40 ha). Visual impacts would be limited to the area of operations. Noise impacts could cause wildlife to avoid an area for a radius up to half a mile (0.8 km) around the project site--about a 500-acre area (200-ha) would be affected. Major long-term impacts to fish and water quality and quantity could occur in the drainage where mining occurs (see the description of biological effects of Alternative B).

Surface geologic studies would have the same negligible effects on the refuge resources as described in Alternative A: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple of hours.

2. Outstanding Opportunities for Solitude - The projected increase in public use in Alternative C would have the same effect on opportunities for solitude as described for Alternative A. In the Atigun Gorge area the chances of seeing another group would be highest during the first week of hunting, the peak use period. The chances of seeing another group would increase about 160% relative to current use levels, particularly along the route into the gorge and the campsites along the river--the areas most likely where other groups would be seen. In the rest of the refuge, south of the existing Arctic Wilderness and the "1002" area, public use is projected to be relatively light--about 510 recreational users. Public use would be expected to occur primarily in areas with good access, such as the Sheenjek and Porcupine rivers. All of the areas probably would be visited by no more than 20 groups, spread out over the summer and early fall. With this low level of use, most groups would not see or hear other groups in the same area.

The commercial timber operation would have the same effect on solitude as described under the Alternative B scenario. Most refuge recreational users in this area (i.e., river floaters) would not be affected by the operation because they would be on the river in the summer, when no timber harvesting would be occurring.

The effect of the mining operation would be identical to that noted for the Alternative B scenario. Visual impacts of the operation would cover a maximum of 100 acres (40 ha). Noise from the machinery could be heard no more than 9 square miles (23 km²) from the mining site--up to 5,800 acres (2,300 ha) could be impacted. However, the mining operation would be expected to have a negligible effect on the solitude of refuge users because the site is not located in a popular recreational use area.

Surface geological studies in this scenario would have the same effect on solitude as described for the Alternative A scenario. The chances of other refuge users seeing or hearing these studies would be very low--the large size of the area (over 4 million acres (1.6 million ha) in the Porcupine Plateau) makes it unlikely that the few recreational users in this area (about 330 recreational users over the year) would encounter the field crew. Furthermore, most recreational use would occur along rivers, while the surface geologic studies would occur over a much larger area that receives little if any use due to the lack of access.

3. Outstanding Opportunities for Primitive Recreation - The projected increase in recreational use would have the same effects on opportunities for primitive recreation as described for Alternative A. The increase in use in the Atigun Gorge would lower the quality of the recreational experience in this area, relative to the rest of the refuge that receives little use--the potential for encountering litter, campsites, trails, and other groups would be higher in the Atigun Gorge, which could adversely affect those seeking a pristine wilderness experience. However, visitors would continue to be able to recreate in an outstanding primitive setting, with no visitor services or facilities, in both of these areas.

The commercial timber harvesting operation in this scenario would have the same effect on primitive recreation opportunities as described for the Alternative B scenario. Most recreational users would not be affected by this use because it would occur at a time when few, if any, recreational users would be present. If a visitor were present during this time the visual impacts and noise of the operation, and the temporary displacement of wildlife from this area would reduce the quality of the primitive recreational experience.

The mining operation in this scenario would have the same effect as described for the Alternative B scenario. The mine is not located at a site known to have outstanding primitive recreation qualities, so few, if any, visitors would be expected to come to this area. Opportunities for primitive recreation would be eliminated in an area up to 100 acres (40 ha), while visual impacts, noise, and displacement of game animals would reduce the quality of the primitive recreation in a 9-square-mile (23 km²) area, covering 5,800 acres (2,300 ha), around the mining site.

Surface geologic studies in this scenario would have the same effect on opportunities for primitive recreation as noted under the Alternative A scenario. Visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of the sites where surface geologic studies occur.

4. Special Features - The Arctic Refuge has many special features, including the Wind, Ivishak and Sheenjek wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, Porcupine Lake, Old John Lake, the ramparts of the Porcupine River, and the upper Coleen River.

The expected increase in public use in the Alternative C scenario would have the same effects on special features as described for Alternative A. Public use in the refuge would be expected to be concentrated in only a few popular areas with good access, such as the Atigun Gorge. The increase in hunters and hikers generally would not be expected to affect the scenic/geologic and wildlife features in the Atigun Gorge. (One resource that may be adversely affected is the local sheep population. As noted under the Alternative A scenario the effect of the projected level of hunters on the local population is unknown.) Most other areas with special features probably would be visited by no more than 20 groups per year, which should not result in adverse impacts to the special features. The projected increase in sport hunting in the refuge would result in additional caribou being harvested, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

The logging and mining operations in this scenario would not occur in areas that are special features of the refuge. Surface geologic studies would not disturb the surface, and thus would be expected to have a negligible effect on the refuge's special features.

The logging and mining operations in this scenario would be expected to have a negligible effect on the Porcupine caribou herd (see the "Biological Effects of Alternative C"). The mining operation would have a negligible effect on the Porcupine caribou herd, as caribou would not be present on the mining site when most of the mining activity would occur. The logging operation also would have a negligible impact on the Porcupine caribou herd: a few animals may be disturbed by this operation in the spring and move to other nearby areas.

Conclusion - The management actions in the Alternative C scenario would not adversely affect wilderness values on 10 million acres (4 million ha) south of the "1002" area and the existing Arctic Wilderness--naturalness, solitude, opportunities for primitive recreation, and special features of the refuge would be maintained in 99% of the refuge for the foreseeable future in this alternative. In certain areas, however, wilderness values would be diminished or lost. The increase in public use could adversely affect perceived naturalness, and opportunities for solitude in the Atigun Gorge (which also is one of the refuge's special features); impacts to wilderness values would occur in a cumulative area totaling one acre along the river during the first week of hunting. The placer mine in the scenario would eliminate perceived naturalness, solitude, and opportunities for primitive recreation in a 100-acre (40-ha) area, and reduce opportunities for solitude and the quality of the recreational experience in another surrounding area totaling no more than 5,800 acres (2,300 ha). The commercial timber harvesting operation would affect the naturalness of the riparian lands along the Porcupine River, totaling less than 200 acres (80 ha), but should not affect other wilderness values. Surface geologic studies in the scenario would have a negligible effect on naturalness, solitude, primitive recreation, and special features.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

With no wilderness additions being proposed in Alternative C, the Alaska Lands Act and existing Service policies and would continue to govern what oil and gas activities occur on the refuge. Oil and gas studies could occur on all of the refuge lands south of the "1002" area; in the Arctic Wilderness and wild river corridors limited oil and gas studies could occur. The Alternative C scenario assumes that only surface geologic studies would occur on the Porcupine Plateau. No oil and gas production would occur because under Section 1003 of the Alaska Lands Act (assuming it is not amended) all of the Arctic Refuge is closed to oil and gas production.

Conclusion - The Alternative C wilderness proposal (i.e., no additional wilderness) would have no effect on the level of oil and gas activities in the Arctic Refuge.

Effects on the Level of Mining Development

There are nine active mining claims in the Arctic Refuge. Mining of valid claims could occur throughout the refuge under Section 304(c) of the Alaska Lands Act. On all of the claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative C. With no new wilderness proposed under this alternative, the Service would take no actions in this alternative that would affect mining activity on the refuge.

Conclusion - With no new wilderness areas proposed, Alternative C would have no effect on the level of mining in the refuge.

Effects on the Level of Commercial Timber Harvesting

Alternative C would not propose any additional areas for wilderness designation. Commercial timber harvesting could be permitted in the moderate management areas, provided it is compatible with refuge purposes.

Conclusion - The Alternative C wilderness proposal would have no effect on the level of commercial timber harvesting operations in the refuge.

ALTERNATIVE D

The scenarios developed for Alternative D assume economic development would not occur on refuge lands on the south side of the Brooks Range, with the exception of hardrock mining. The Alternative D scenario projects current public use levels into the future assuming more people seeking a wilderness experience continue to be attracted to the refuge (and not because of any actions the Service takes); the remoteness and high cost of reaching the refuge, however, would limit the expected increase in public use.

Public Use Scenario

In the Alternative D scenario the Service would continue to manage public use in the refuge as it has in the past. All of the assumptions described for the Alternative A scenario (e.g., popular use areas, proportions of different recreational uses, seasons and bag limits) would be the same for this scenario. Thus, the recreational use levels in the Alternative D scenario would be the same as described in the Alternative A scenario.

In the Alternative D scenario aircraft access would not be limited. It is assumed in this scenario that the aircraft use levels in the Firth River-Mancha Creek area would be the same as in the Alternative A scenario.

Development Scenario

In the Alternative D scenario hardrock mining would be the only form of economic development that would occur on refuge lands in the year 2000. Oil and gas exploration and development and commercial timber harvesting would not occur in this scenario (see below).

Commercial Timber Operation

In Alternative D all of the refuge lands would be designated as minimal management areas, wild river management areas, or wilderness areas. Commercial timber operations would not be permitted in the refuge in the future under these management categories. For the purposes of analysis it is therefore assumed that commercial timber operations would not occur on the refuge over the next 50 years.

Mining

The Alternative D scenario assumes that a placer mining operation for gold recovery would be developed on refuge lands near the Christian River. The mining scenario for this operation, including the development assumptions, is the same as described in the Alternative B scenario.

Oil and Gas Activities

In Alternative D, geologic studies, including surface rock collection, gravimetric surveying and geological mapping activities, could be permitted on a site-specific basis throughout the refuge. Seismic surveys, core drilling, and other oil and gas studies involving the use of motorized equipment could be permitted south of the wilderness portion of the refuge and the "1002"

area. Limited oil and gas studies could be permitted in the wilderness area. Under Section 1003 of the Alaska Lands Act, all of the Arctic Refuge is closed to oil and gas leasing and production. For the purposes of analysis it is assumed that oil and gas leasing and production would continue to be prohibited south of the "1002" area. The scenario assumes that seismic studies and core drilling would not occur during the life of the plan because of the expense involved in field work and the likelihood that companies would conduct these studies only on lands available for oil and gas development. In the scenario only surface geologic studies would occur south of the "1002" area, in the non-wilderness portions of the refuge. The assumptions for surface geologic studies would be the same as described in the Alternative A scenario.

Biological Effects of Alternative D (For the Life of the Plan - 15 Years)

Vegetation

Public use in this scenario would have the same effect on vegetation as described for the Alternative A scenario: a negligible effect. Surface geologic studies also would have a negligible effect on vegetation.

Placer mining in this scenario would have the same effects on vegetation as noted under the Alternative B scenario. This activity would have major, long-term impacts on the vegetation in the entire drainage where the claim is sited.

From a refuge-wide perspective, the impacts of Alternative D on refuge vegetation would be negligible, although significant, long-term, localized impacts would occur with mining.

Fish

As discussed under Alternative A, the projected increase in public use would have negligible effects on refuge fishery resources, primarily because fishing would probably remain incidental to other recreational pursuits, such as floating rivers or hunting. Surface geologic studies would not affect refuge fish populations. Placer mining along a small tributary of the Christian River would have the same adverse effects described for Alternatives B and C: mining would have a major, long-term adverse impact on local fish populations and habitats. Because of the relatively small size of mining activities in the scenario, however, the effect of mining on refuge fish populations would be negligible.

Overall, Alternative D would have a negligible impact on anadromous and resident fish populations in the Arctic Refuge, with major localized impacts due to mining.

Waterfowl

As discussed for Alternative A, increasing public use is not expected to adversely affect waterfowl populations. Surface geologic studies and the placer mining operation assumed in the scenario would have a negligible effect on waterfowl populations. Thus, Alternative D would have a negligible impact on aquatic birds.

Shorebirds

The public use level projected in the Alternative D would not be expected to alter shorebird distributions or numbers. Placer mining would have a negligible effect on refuge shorebird populations, as few shorebirds use the area noted in the scenario. Surface geologic studies would not affect the refuge's shorebird populations. Thus, Alternative D would have a negligible effect on the refuge's shorebird populations.

Raptors

Increasing recreational use of river corridors could have a minor impact on refuge raptors if disturbances during the early summer result in nest abandonment or displacement into less suitable habitats during courtship. Surface geologic studies, and placer mining would have the same negligible impact on refuge raptor populations as described for Alternative C. Thus, the Alternative D scenario would have a minor effect on the refuge's overall raptor populations.

Marine Mammals

Alternative D would have the same negligible impact on Arctic Refuge's marine mammal populations as described for Alternative C.

Caribou

As discussed for Alternative C, the level of public use in this scenario would not be expected to significantly affect the refuge's caribou. Surface geologic studies also would not measurably affect the caribou population. Placer mining in this scenario would be expected to have the same negligible effect as described for Alternative C. Thus, from a refuge-wide perspective Alternative D would have a negligible effect on the refuge's caribou population.

Moose

The impact of Alternative D on moose would be similar to that described for Alternative C. The level of recreational use described in the scenario would not adversely affect refuge moose. Placer mining would displace moose to adjacent areas, but would have negligible impacts on refuge moose populations. Surface geologic studies under this scenario would have a negligible effect on moose. Overall, Alternative D would have a negligible impact on the refuge's moose population.

Dall Sheep

The level of public use, mining, and surface geologic studies in the Alternative D scenario would have the same negligible effect on the refuge's Dall sheep population as described for Alternative C.

Muskox

The level of public use and other activities included in Alternative D scenario would have the same negligible impact on refuge habitats and muskox population as described for Alternative C.

Brown and Black Bear

Alternative D would have the same effects on the refuge's bear populations as Alternative C. The projected level of public use could result in slightly increased numbers of human/bear conflicts and bears killed in defense of life and property. Placer mining and surface geologic studies would have little effect on black and brown bear populations, although again some bears could be lost due to bears being shot in defense of life and property. Overall, the public and economic uses in Alternative D would have a negligible effect on the refuge's bear populations.

Furbearers

The level of public use, the placer mine, and surface geologic studies in the Alternative D scenario would be expected to have the same negligible effect on refuge furbearer populations and their habitats as described for Alternative C.

Threatened and Endangered Species

The level of recreational use projected in the Alternative D scenario would not affect the refuge's threatened and endangered species, with the possible exception of American and arctic peregrine falcons. The American peregrine falcon nests on the Porcupine River cliffs, and the arctic peregrine falcon may nest on rivers on the north slope which refuge users float. The projected level of recreational use in this scenario would have the same potential impacts as described under Alternative A. Breeding raptors generally are very sensitive to disturbance. Reproductive success would be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers known to sustain peregrine falcons at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor the peregrines and river use to ensure that impacts are avoided.

No threatened or endangered species are known to occur in the placer mining site in the scenario. No other activities are proposed under the Alternative D scenario that would affect the refuge's threatened or endangered species.

Water Quality and Quantity

The effects of Alternative D on water quality and quantity would be similar to those described for Alternative C. Minor, localized impacts to water quality could occur from recreational users on popular rivers and lakes, particularly at regularly used campsites, due to improperly buried wastes. Refuge water quantities would not be affected. Placer mining would have major long-term impacts on the water quality and quantity within the drainage where mining activities occurred, but the small scale operation described in the scenario would have a negligible impact on water quality and quantity in the refuge as a whole. Surface geologic studies would not affect water quality or quantity.

Overall, Alternative D would have a negligible effect on the refuge's water quality and quantity, with minor to major localized impacts possible due to public use and mining.

Air Quality

The Alternative D scenario would have the same negligible effects on refuge air quality as noted for Alternative C.

Ecosystems

Alternative D would have the same effects on refuge ecosystems and natural diversity as described for Alternative C. The level of public use projected in the scenario would have a negligible impact on refuge ecosystems and natural diversity. Placer mining would have a moderate impact on the ecosystems in the immediate area surrounding the claim site, but would have a negligible impact on natural diversity and ecosystems throughout the rest of the refuge. Surface geologic studies would have a negligible effect on the refuge's ecosystems and natural diversity. Overall, the alternative would have a negligible effect on the refuge's natural processes and species diversity in Arctic Refuge.

Socioeconomic Effects of Alternative D (For the Life of the Plan - 15 Years)

Population

Alternative D would have the same negligible effect on the population of the local communities as Alternative C. The increase in public use in the Alternative D scenario would be expected to have a negligible impact. Likewise, surface geologic studies and the small mining operation in the scenario would have a negligible effect on the local population. The overall impact from the Alternative D scenario on the local population is expected to be negligible.

Economy

The effects of surface geologic studies and mining on the local economy would be negligible, the same as described for the Alternative C scenario. The increase in recreational use would be expected to have a negligible positive effect on the local economy, the same as in the Alternative A scenario.

Overall, the Alternative D scenario would have a negligible, positive effect on the local economy.

Subsistence/Section 810(a) Evaluation and Finding

The Alternative D scenario would have a negligible effect on subsistence users and the resources they use. This scenario would not affect the subsistence needs of local residents. Subsistence activities would continue to be an important part of many local residents' lives.

The level of development (and the timing and management stipulations) and the level of public use described in the scenario would be expected to result in a negligible to minor effect on the refuge's fish and wildlife populations--subsistence species populations would not be expected to change appreciably as a result of the uses assumed in the scenario. The subsistence activities of most local residents therefore would not be significantly affected by this use.

The mining operation near the Christian River would significantly affect refuge resources in the area of operations. Some subsistence species would be displaced from the area of operations. This area, however, is not heavily used by local residents for subsistence purposes. Local residents probably could find adequate resources in nearby areas.

The increase in recreational hunting and fishing in the Alternative D scenario is the same as assumed in the previous alternatives. The Alternative D scenario thus would have the same effect on subsistence as noted for the other scenarios. Competition between local residents and recreational users for resources could increase in popular areas that have relatively good access, such as the Hulahula River. The expected increases in harvest levels resulting from the increase in recreational use would not be expected to adversely affect subsistence users--the Alaska Department of Fish and Game and the Service would monitor use levels to ensure that opportunities for subsistence harvests are maintained.

The most significant adverse impact of the Alternative D scenario probably would be the perception of Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents that more "outsiders" are intruding on their way of life, reducing opportunities for subsistence activities. In addition to the increase in recreational users, in this alternative a mining operation and surface geologic studies would be occurring in the refuge. With more aircraft and boats in the refuge, and a higher potential for seeing people, local residents would likely grow concerned that their subsistence way of life is being threatened.

Availability of Other Lands - As noted in the Section 810(a) evaluation for Alternative A, there may be other lands available for the uses considered, but lands outside of the refuge are not considered because they are beyond the scope of this plan. The Alternative D public use scenario focused on existing and potential popular recreational use areas. There are other areas within the refuge that could provide opportunities for similar use, but they have not been identified by the Service.

The mining operation considered in the scenario is a site-specific project. There are only a few active claims in the Arctic Refuge where a mine could be developed. Whether these claims are developed depends on the resources, and the economics of developing a particular site.

Other Alternatives - Seven management alternatives were developed for the Arctic Refuge plan. Five of the alternatives do not provide for new economic uses in the refuge; two of the alternatives provide for new economic uses. All of the alternatives would permit increased recreational use of the refuge if it is compatible with refuge purposes, although Alternative G would limit the increase to protect the refuge's existing wilderness values.

Findings - Under the Alternative D scenario additional public use, mining, and surface geologic studies are projected to occur. Concerns of local residents about impacts to their way of life may intensify with these uses. All of the potential impacts that would result from the Alternative D scenario would be localized. None of the projected uses in the scenario would adversely affect subsistence fish and wildlife population levels, although some negligible to minor impacts could occur (e.g., wildlife may be displaced from the area where mining occurs). The mining operation could displace some local residents from an area where they occasionally hunt and trap, but other nearby areas probably could be used for subsistence activities. Increased harvest levels would occur with the increase in sport hunting and fishing, but sufficient resources would be available to meet subsistence user needs. It also should be noted that both the Service and the State of Alaska would take steps to ensure that opportunities for subsistence harvests are maintained. The Service thus concludes that Alternative D would not result in significant restrictions to subsistence uses on the Arctic Refuge.

Recreation

Under the Alternative D scenario recreational use would increase the same as projected in the Alternative A scenario. Thus this alternative generally would have the same effect on recreational use as described for Alternative A. Alternative D would not affect most opportunities to hunt, fish, or pursue nonconsumptive uses in the refuge. The projected increase in use may result in increased competition, perceived crowding, and other recreational user conflicts in popular areas. In particular, some sheep hunters, hikers and floaters seeking solitude may perceive the Atigun Gorge area, the Peters/Schrader lakes area, and the Hulahula and Kongakut drainages at times to be overcrowded. The increase in competition for resources in the Atigun Gorge area eventually may require the Service to propose regulations to the Alaska Department of Fish and Game and the Board of Game to limit harvests or restrict specific uses.

Although development of the placer mine near the Christian River in the scenario could displace recreational users, particularly those individuals seeking a wilderness experience, it is expected that this area would receive little, if any, recreational use. Thus, the mine would have a negligible effect on recreational use.

Surface geologic studies would not be expected to affect refuge recreational use.

Overall, Alternative D would have a negligible effect on recreational use in the Arctic Refuge. In localized areas (i.e., Atigun Gorge, Hulahula and Kongakut drainages) the projected increase in recreational use could result in minor adverse impacts such as some perceived overcrowding.

Cultural Resources

Alternative D would have the same negligible effect on cultural resources as described for Alternative C. Some damage to sites may occur incidental to subsistence activities and increased recreational use levels. The highest potential for damage occurring would be at frequently used camping sites because of the possibility that these sites were used in the past. Surface geologic studies would not be expected to affect archaeological and historic sites. The mining operation could damage the sites when areas are cleared for sluicing operations, and refuge lands that are excavated for settling ponds and other support facilities. Site-specific cultural resource inventories would be required prior to undertaking these economic uses to reduce the potential for impacts (although incidental damage could still occur at undetected sites).

Wilderness Designation Effects of Alternative D (50 Years)

In Alternative D the Service would propose most of the non-wilderness lands in the Brooks Range (about 5.2 million acres or 2.1 million ha) for wilderness designation. The "1002" coastal plain, lands along the lower Wind River, the Junjik River and the East Fork of the Chandalar River, and the Porcupine Plateau, covering a total of about 6.0 million acres (2.4 million ha) would not be proposed for designation--these areas would be included as minimal management areas.^{a/} Table 10 in Chapter V indicates what uses would be permitted in the wilderness and non-wilderness portions of the refuge. Wilderness designation would provide long-term congressional protection to fish and wildlife habitats found in these areas of the refuge.

Impacts on Areas Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Public use would be the only activity allowed which could affect naturalness in the proposed wilderness under the Alternative D scenario. The increase in public use in the Alternative D scenario would be the same as described for the Alternative A scenario--the same type of users (e.g., hunters, floaters, hikers) and the level of intensity of use would be about the same in this alternative as in Alternative A. Public use is expected to continue to increase on the refuge, regardless of whether additional wilderness is designated, as more people learn about the refuge and its many recreational values. On the other hand, the remoteness and cost of reaching the refuge will limit the increase in use.

The projected increase in public use in the Atigun Gorge area, potentially one of the most popular areas in the proposed wilderness area, would have the same effects on naturalness as described under the Alternative A scenario.

^{a/}The "1002" coastal plain area would be managed as a minimal management area pending congressional action.

Increased littering, more campsites, and the presence of obvious trails would be expected in this area, affecting a total cumulative area of not more than one acre (0.4 ha). This impact, however, would occur independently of the wilderness designation action--as noted above, public use is projected to increase in the scenario regardless of whether additional areas are designated as wilderness in the Arctic Refuge.

In the rest of the approximately 5-million-acre (2-million-ha) proposed wilderness area, public use is projected to be relatively light: at most 45 floaters, 90 hunters, and 45 hikers are projected to use this area. Most areas would not be visited by more than 10 groups per year. This level of use would not be expected to result in adverse impacts to naturalness.

No other uses are projected in the proposed wilderness area.

2. Outstanding opportunities for solitude - The projected increase in public use would have the same effect on opportunities for solitude as described under the Alternative A scenario. In the Atigun Gorge area the chances of seeing another group would be highest during the first week of sheep hunting, the peak use period. The chances of seeing another group would increase about 160% relative to current use levels, particularly along the route into the gorge and the campsites along the river--the areas most likely where other groups would be seen. (It should be noted again that this impact would occur independently of the wilderness designation action--public use is expected to increase regardless of whether additional areas are designated as wilderness in the refuge.)

In the rest of the proposed wilderness area public use is projected to be relatively light--less than 200 recreational users. Public use would be expected to occur primarily in areas with good access, such as Porcupine Lake. Most areas probably would not be visited by more than 10 groups, spread out over the summer and early fall. It is unlikely, with this low level of use, that most groups would see or hear other groups in the same area.

No other uses are projected in the proposed wilderness.

3. Outstanding opportunities for primitive recreation - The projected increase in recreational use would have the same effects on opportunities for primitive recreation as described for Alternative A. The increase in use in the Atigun Gorge area would lower the quality of the recreational experience relative to the rest of the refuge that receives little use--the potential for encountering litter, campsites, trails, and other groups would be higher in the Atigun Gorge, which could adversely affect those seeking a pristine wilderness experience. However, visitors would continue to be able to recreate in an outstanding primitive setting, with no visitor services or facilities in the area.

No other uses are projected in the proposed wilderness area that would affect opportunities for primitive recreation.

4. Special features - The proposed wilderness area has many special features, including the Wind and Ivishak wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, and Porcupine Lake.

The expected increase in public use in the Alternative D scenario would have the same effects on special features as described for Alternative A. Public use in the area proposed for wilderness would be expected to be concentrated in only a few popular areas with good access, such as the Atigun Gorge. The increase in hunters and hikers generally would not be expected to affect the scenic/geologic and wildlife features in the Atigun Gorge. (One resource that may be adversely affected is the local sheep population. As noted under the Alternative A scenario the effect of the projected level of hunters on the local population is unknown.) Most other areas with special features probably would be visited by no more than 10 groups per year, which should not result in adverse impacts to the special features. The projected increase in sport hunting in the proposed wilderness would result in additional caribou being harvested, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

Conclusion - Wilderness designation would help maintain the naturalness, solitude, primitive recreation, and special features on about 5.2 million acres (2.1 million ha) in the Arctic Refuge. The increase in public use could adversely affect perceived naturalness, and opportunities for solitude, and the quality of the primitive recreational experience in the Atigun Gorge (which also is one of the refuge's special features); impacts to wilderness values would primarily occur in a cumulative area totaling one acre along the river during the first week of hunting. These impacts would occur, however, regardless of whether or not additional wilderness is designated in the refuge. No impacts to wilderness values would occur from mining in this alternative because the mining development considered in the scenario is not in the area proposed for wilderness.

Effect on the Level of Oil and Gas Activities

Under Section 1003 of the Alaska Lands Act all of the Arctic Refuge is closed to oil and gas leasing. Therefore, unless the statute is amended, designating additional wilderness in the refuge would have no effect on oil and gas leasing activities in the Arctic Refuge. Oil and gas studies could occur in designated wilderness, but motorized surface equipment generally would not be permitted--core drilling and seismic surveys would not be permitted (unless conducted under the provisions of Section 1010 of the Alaska Lands Act).

Conclusion - The Alternative D wilderness proposal would limit oil and gas studies on about 5.2 million acres (2.1 million ha, or 46% of the non-wilderness refuge lands). It would have no effect on the level of oil and gas development in the refuge as this use already is prohibited under law.

Effect on the Level of Mining Development

There are two active mining claims in the proposed wilderness area. On all of the claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. Mining of valid claims could occur throughout the refuge, including the proposed wilderness area, under Section 304(c) of the Alaska Lands Act.

However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative D. The mining development considered in the scenario is not in the area proposed for wilderness.

Conclusion - The Alternative D wilderness proposal would have no effect on the level of mining in the refuge.

Effect on the Level of Commercial Timber Harvest Operations

Wilderness designation would preclude this economic use if it was proposed in the Brooks Range. However, none of the management categories designated in this alternative would permit commercial timber harvesting. The proposed area also is not believed to have timber of commercial value. (The area where timber harvesting is assumed in the Alternative B and C scenarios is not included in this wilderness proposal.)

Conclusion - The Alternative D wilderness proposal would have no effect on the level of commercial timber harvesting in the refuge.

Impacts on Areas Not Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Activities which would be allowed on the non-wilderness portion of the refuge under the Alternative D scenario, and which could affect naturalness, include recreational use, surface geologic studies, and mining.

Relatively little public use is projected in the Porcupine Plateau and the other areas south of the existing Arctic Wilderness--about 60 hunters, 255 floaters, and 15 hikers. With only a few users, spread out over about 4.5 million acres (1.8 million ha) in the summer and early fall, this alternative should not affect the naturalness of the area.

The mining operation in the scenario would have the same effects on the landscape of the refuge as those noted under the Alternative B scenario. Mining would substantially alter the landscape of the refuge, including vegetation and fish and wildlife resources, at the immediate operation site, while noise impacts could displace wildlife up to half a mile radius from the project site--about a 500-acre (200-ha) area would be affected. (See the description of biological effects of Alternative B.)

Surface geologic studies in this scenario would have the same effect on naturalness as noted under the Alternative A scenario: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple of hours.

2. Outstanding opportunities for solitude - The projected increase in public use would not affect most of the areas not proposed for wilderness. As noted above, public use is projected to be relatively light--less than 350 recreational users. Even areas with good access, such as the Sheenjek River, probably would be visited by no more than 20 groups per year. Most groups would not see or hear other groups in the same area with this low level of use.

The effect of the mining operation would be identical to that noted for the Alternative B scenario. Visual impacts of the operation would cover a maximum of 100 acres (40 ha). Noise from the machinery could be heard no more than 9 square miles (23 km²) from the mining site--up to 5,800 acres (2,300 ha) could be impacted. However, the mining operation would be expected to have a negligible effect on the solitude of refuge users because the site is not located in a popular recreational use area.

Surface geologic studies in this scenario would have the same effect on solitude as described for the Alternative A scenario. The chances of other refuge users seeing or hearing these studies would be very low--the large size of the areas not proposed for wilderness (about 6 million acres (2.4 million ha)) makes it unlikely that the few recreational users (less than 350 recreational users over the year) would encounter the field crew. Furthermore, most recreational use would occur along rivers, while the surface geologic studies would occur over a much larger area that receives little if any use due to the lack of access.

3. Outstanding opportunities for primitive recreation - The projected level of recreational use in this scenario would not affect opportunities for primitive recreation in the areas not proposed for wilderness designation.

The mining operation in this scenario would have the same effect as described for the Alternative B scenario. The mine is not located at a site known to have outstanding primitive recreation qualities, so no visitors would be expected to come to this area. Opportunities for primitive recreation would be eliminated in an area up to 100 acres (40 ha), while visual impacts, noise, and displacement of game animals would reduce the quality of the primitive recreation in a 9-square-mile (23-km²) area, covering 5,800 acres (2,300 ha), around the mining site.

Surface geologic studies in this scenario would have the same effect on opportunities for primitive recreation as noted under the Alternative A scenario. Visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of the sites where surface geologic studies occur.

4. Special features - Special features found in the areas not proposed for wilderness include the Sheenjek Wild River, lower Wind Wild River, the Porcupine caribou herd, Old John Lake, the ramparts of the Porcupine River, and the upper Coleen River.

The expected increase in public use in the Alternative D scenario would have the same effects on special features as described for Alternative A. Public use in the Porcupine Plateau would be expected to be concentrated in a few areas with good access, such as the Sheenjek and Porcupine rivers. Most other areas with special features probably would be visited by no more than 20 groups per year, which should not result in adverse impacts to the special features. The projected increase in sport hunting in the area would result in additional caribou being harvested, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

The mining operation in this scenario would not occur in an area that is a special feature of the refuge. This use also would have a negligible effect on the Porcupine caribou herd, as caribou would not be present on the mining site when most of the mining activity would occur. Wintering caribou would simply avoid the areas with structures and areas stripped of vegetation, and would probably migrate around the site. Surface geologic studies would not disturb the surface, and thus would be expected to have a negligible effect on the refuge's special features.

Conclusion - The management actions in the Alternative D scenario would have a negligible effect on the wilderness values in the areas not proposed for wilderness designation--naturalness, solitude, opportunities for primitive recreation, and special features generally would be maintained in this alternative. In one area wilderness values would be diminished or lost: the placer mine in the scenario would eliminate perceived naturalness, solitude, and opportunities for primitive recreation in a 100-acre (40-ha) area, and reduce opportunities for solitude and the quality of the recreational experience in another surrounding area totaling no more than 5,800 acres (2,300 ha). The projected level of recreational use and surface geologic studies would have a negligible effect on wilderness values.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

The Alaska Lands Act and existing Service policies would continue to govern what oil and gas activities occur in the areas not proposed for wilderness designation. Oil and gas studies could occur on all of these areas, about 6.0 million acres (2.4 million ha), with some restrictions in the lower Wind and Sheenjek wild river corridors. The Alternative D scenario assumes that only surface geologic studies would occur on the Porcupine Plateau. No oil and gas leasing or development would occur because under Section 1003 of the Alaska Lands Act (assuming it is not amended) all of the Arctic Refuge is closed to oil and gas development.

Conclusion - Alternative D would have no effect on the level of oil and gas activities in the area not proposed for wilderness designation.

Effect on the Level of Mining Development

There are seven active mining claims in the portion of the refuge not proposed for wilderness under Alternative D. On these claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. Mining of valid claims could occur throughout the refuge under Section 304(c) of the Alaska Lands Act. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative D.

Conclusion - Alternative D would have no effect on the level of mining in the non-wilderness portion of the refuge.

Effect on the Level of Commercial Timber Harvesting

Under Alternative D all of the areas not designated or proposed for wilderness would be designated as minimal management or wild river management areas. Commercial timber harvesting would not be permitted under these management categories.

Conclusion - Alternative D would preclude commercial timber harvesting in the areas not proposed for wilderness designation.

ALTERNATIVE E

The scenarios developed for Alternative E assume economic development would not occur on refuge lands on the south side of the Brooks Range, with the exception of mineral development (mining). The Alternative E scenario projects current public use levels into the future assuming more people seeking a wilderness experience continue to be attracted to the refuge (and not because of any actions the Service takes); the remoteness and high cost of reaching the refuge, however, would limit the expected increase in public use.

Public Use Scenario

In the Alternative E scenario the Service would continue to manage public use in the refuge as it has in the past. All of the assumptions described for the Alternative A scenario (e.g., popular use areas, proportions of different recreational uses, seasons and bag limits) would be the same for this scenario. Thus, the recreational use levels in the Alternative E scenario would be the same as described in the Alternative A scenario.

In the Alternative E scenario aircraft access would not be limited. It is assumed in this scenario that the aircraft use levels in the Firth River-Mancha Creek area would be the same in the Alternative E scenario as in the Alternative A scenario.

Development Scenario

In the Alternative E scenario hardrock mining would be the only form of economic development that would occur on refuge lands in the year 2000. Oil and gas leasing and production and commercial timber harvesting would not occur in this scenario (see below).

Commercial Timber Operation

In Alternative E all of the refuge lands would be designated as either minimal management areas, wild river management, or wilderness areas. Commercial timber operations would not be permitted in the refuge in the future under these management categories. For the purposes of analysis it is therefore assumed that commercial timber operations would not occur on the refuge over the next 50 years.

Mining

The Alternative E scenario assumes that a placer mining operation for gold recovery would be developed on refuge lands near the Christian River. The mining scenario for this operation, including the development assumptions, is the same as described in the Alternative B scenario.

Oil and Gas Activities

In Alternative E, geologic studies, including surface rock collection, gravimetric surveying and geological mapping activities, could be permitted on a site-specific basis throughout the refuge. Seismic surveying and core drilling could be permitted in the non-wilderness portions of the refuge south of the "1002" area. Limited oil and gas studies could be permitted in the

wilderness area and wild river corridors. Under Section 1003 of the Alaska Lands Act, all of the Arctic Refuge is closed to oil and gas leasing and production. For the purposes of analysis it is assumed that oil and gas leasing and production would continue to be prohibited south of the "1002" area. The scenario assumes that seismic studies and core drilling would not occur during the life of the plan because of the expense involved in field work and the likelihood that companies would conduct these studies only on lands available for oil and gas development. In the scenario only surface geologic studies would occur south of the "1002" coastal plain area, in the non-wilderness portions of the refuge, for the next 50 years. The assumptions for surface geologic studies would be the same as described in the previous four scenarios.

Biological Effects of Alternative E (For the Life of the Plan - 15 Years)

Vegetation

This alternative would have the same negligible effect on vegetation as described for Alternative A--the projected refuge uses in Alternative E would not be expected to significantly alter vegetation.

Fish

As discussed under Alternative A, the projected increase in public use would have negligible effects on refuge fishery resources. Surface geologic studies would not affect the refuge's fish populations. Placer mining along a small tributary of the Christian River would have the same adverse effects described for Alternatives B, C and D: mining would have a major, long-term adverse impact on local fish populations and habitats. Because of the relatively small size of mining activities in the scenario, however, the effect of mining on refuge fish populations would be negligible. From a refuge-wide perspective, Alternative E would have a negligible impact on anadromous and resident fish populations in the Arctic Refuge.

Waterfowl

Alternative E would have the same negligible effects on the refuge's waterfowl populations as Alternatives C and D. The projected level of public use would not significantly affect waterfowl populations. Surface geologic studies would not affect waterfowl, while the placer mining operation assumed in the scenario would have a negligible effect on waterfowl populations.

Shorebirds

Alternative E would have the same negligible effects on shorebirds as Alternatives C and D. The public use level projected and surface geologic studies would not be expected to alter shorebird distributions or numbers. Placer mining would have a negligible effect on refuge shorebird populations.

Raptors

The Alternative E scenario would have the same effect as Alternatives C and D on the refuge's raptor populations. Increasing recreational use of river corridors could have a minor impact on refuge raptors if disturbances during

the early summer result in nest abandonment or displacement into less suitable habitats during courtship. Placer mining and surface geologic studies would have a negligible impact on refuge raptor populations.

Marine Mammals

Alternative E would have the same negligible impact on the Arctic Refuge's marine mammal populations as described for Alternatives C and D.

Caribou

Alternative E would have a negligible effect on the refuge's caribou population, the same as Alternatives C and D. The level of public use in this scenario would not be expected to appreciably affect the refuge's caribou. Placer mining and surface geologic studies would have a negligible effect on the refuge's caribou--only highly localized, short-term displacement would occur.

Moose

The impact of Alternative E on moose would be identical to that described for Alternatives C and D. The level of recreational use described in the scenario would not adversely affect refuge moose. Placer mining would displace moose to adjacent areas, but would have negligible impacts on refuge moose populations. Surface geologic studies under this scenario would have a negligible effect on moose. Overall, Alternative E would have a negligible impact on the refuge's moose population.

Dall Sheep

The level of public use, mining, and surface geologic studies in the Alternative E scenario would have the same negligible effect on the refuge's Dall sheep population as described for Alternatives C and D.

Muskox

The Alternative E scenario would have the same negligible impact on refuge habitats and muskox population as noted for Alternatives C and D.

Brown and Black Bear

The projected level of public use in Alternative E could result in slightly increased numbers of human/bear conflicts and bear killed in defense of life and property. Placer mining and surface geologic studies would have little effect on black and brown bear populations, although again some bears could be lost due to bears being shot in defense of life and property. Overall, the Alternative E scenario would have a negligible effect on the refuge's bear populations.

Furbearers

The level of public use, the placer mine, surface geologic studies, and oil and gas studies in the Alternative E scenario would be expected to have the same negligible effect on refuge furbearer populations and their habitats as noted for Alternatives C and D.

Threatened and Endangered Species

The level of recreational use projected in the Alternative E scenario would not affect the refuge's threatened and endangered species, with the possible exception of American and arctic peregrine falcons. The American peregrine falcon nests on the Porcupine River cliffs, and the arctic peregrine falcon may nest on rivers on the north slope which refuge users float. The projected level of recreational use in this scenario would have the same potential impacts as described under Alternative A. Breeding raptors generally are very sensitive to disturbance. Reproductive success would be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers known to sustain peregrine nests at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor river use to ensure that impacts to nesting peregrines are avoided.

No threatened or endangered species are known to occur in the placer mining site in the scenario. No other activities are proposed under the Alternative E scenario that would affect the refuge's threatened or endangered species.

Water Quality and Quantity

Alternative E would have the same effects on water quality and quantity as Alternatives C and D. Minor, localized impacts to water quality could occur from recreational users on popular rivers and lakes, particularly at regularly used campsites; refuge water quantities would not be affected. Placer mining would have major long-term impacts on the water quality and quantity within the drainage where mining activities occurred, but the small scale operation described in the scenario would have a negligible impact on water quality and quantity in the refuge as a whole. Surface geologic studies would not impact water quality or quantity. In summary, Alternative E would have a negligible effect on the refuge's overall water quality and quantity, with minor to major localized impacts possible due to public use and mining.

Air Quality

The Alternative E scenario would have the same negligible effects on refuge air quality as noted for Alternatives C and D.

Ecosystems

Alternative E would have the same negligible effects on refuge ecosystems and natural diversity as described for Alternatives C and D. The level of public use and surface geologic studies projected in the scenario would have a negligible impact on refuge ecosystems and natural diversity. Placer mining would have a moderate impact on the ecosystems in the immediate area surrounding the claim site, but would have a negligible impact on natural diversity and ecosystems throughout the rest of the refuge.

Socioeconomic Effects of Alternative E (For the Life of the Plan - 15 Years)

Population

The Alternative E scenario would have the same negligible effect on the population of the local communities as described for the Alternative C and D scenarios. The small mining operation, surface geologic studies, and the increase in public use in the scenario would have a negligible effect on the local population.

Economy

Surface geologic studies and mining in this scenario would have a negligible effect on the local economy, the same as described for the Alternative C and D scenarios. The increase in recreational use would be expected to have a negligible positive effect on the local economy, the same as in the Alternative A scenario. Overall, the Alternative E scenario would have a negligible, positive effect on the local economy.

Subsistence/Section 810(a) Evaluation and Finding

The Alternative E scenario would have the same effect on subsistence users and the resources they use as discussed for Alternatives C and D. This scenario would not affect the subsistence needs of local residents. Subsistence activities would continue to be an important part of many local residents' lives.

The projected mining operation, surface geologic studies, and the level of public use described in the scenario would be expected to result in a negligible to minor effect on the refuge's fish and wildlife populations. Some animals may be displaced to other areas by the mining operation, but local residents probably could find adequate resources in nearby areas. The expected increases in harvest levels resulting from the increase in recreational use would not be expected to adversely affect subsistence users, although competition between local residents and recreational users for resources could increase in popular areas that have relatively good access, such as the Hulahula River. The Alaska Department of Fish and Game and the Service would monitor use levels to ensure that opportunities for subsistence harvests are maintained.

The most significant adverse impact of the Alternative E scenario probably would be the perception of Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents that more "outsiders" are intruding on their way of life, reducing opportunities for subsistence activities. In addition to the increase in recreational users, in this scenario a mining operation and surface geologic studies would occur in the refuge. With more aircraft and boats in the refuge, and a higher potential for seeing people, local residents would likely grow concerned that their subsistence way of life is being threatened.

Availability of Other Lands - As noted in the Section 810(a) evaluation for Alternative A, there may be other lands available for the uses considered, but lands outside of the refuge are not considered because they are beyond the scope of this plan. The Alternative E public use scenario focused on existing and potential popular recreational use areas. There are other areas within the refuge that could provide opportunities for similar use, but they have not been identified by the Service.

The mining operation considered in the scenario is a site-specific project. There are only a few active claims in the Arctic Refuge where a mine could be developed. Whether these claims are developed depends on the resources, and the economics of developing a particular site.

Other Alternatives - Seven management alternatives were developed for the Arctic Refuge plan. Five of the alternatives do not provide for new economic uses in the refuge; two of the alternatives provide for new economic uses. All of the alternatives would permit increased recreational use of the refuge if it is compatible with refuge purposes, although Alternative G would limit the increase to protect the refuge's wilderness values.

Findings - Under the Alternative E scenario additional public use, mining, and oil and gas studies are projected to occur. Concerns of local residents about impacts to their way of life may intensify with these uses. All of the potential impacts that would result from the Alternative E scenario would be localized. None of the projected uses in the scenario would adversely affect subsistence fish and wildlife population levels, although some negligible to minor impacts could occur (e.g., wildlife may be displaced from the mining operation area). The mining operation could displace some local residents from an area where they occasionally hunt and trap, but other nearby areas probably could be used for subsistence activities. Increased harvest levels would occur with the increase in sport hunting and fishing, but sufficient resources would be available to meet subsistence user needs. It also should be noted that both the Service and the State of Alaska would take steps to ensure that opportunities for subsistence harvests are maintained. The Service thus concludes that Alternative E would not result in significant restrictions to subsistence uses on the Arctic Refuge.

Recreation

The Alternative E scenario generally would have the same negligible effect on recreational use as described for Alternative A. Alternative E would not affect most opportunities to hunt, fish, or pursue nonconsumptive uses in the refuge. Surface geologic studies in the scenario would not be expected to affect refuge recreational use, while the mining operation would have a negligible effect on recreational use. The projected increase in recreational use may result in increased competition, perceived crowding, and other recreational user conflicts in popular areas. In particular, some sheep hunters, hikers and floaters seeking solitude may perceive the Atigun Gorge area, the Peters/Schrader lakes area, and the Hulahula and Kongakut drainages at times to be overcrowded. The increase in competition for resources in the Atigun Gorge area eventually may require the Service to propose regulations to the Alaska Department of Fish and Game and the Board of Game to limit harvests or restrict specific uses.

Cultural Resources

Alternative E would have the same negligible effect on cultural resources as described for Alternatives C and D. Some damage to sites may occur incidental to subsistence activities and increased recreational use levels. The highest potential for damage occurring would be at camping sites because of the possibility that these sites were used in the past. The mining operation and oil and gas studies have some potential to damage archaeological and historic sites. These potential impacts largely would be avoided by completing cultural resource inventories and evaluations, and through the use of mitigation or preservation measures.

Wilderness Designation Effects of Alternative E (50 Years)

In Alternative E the Service would propose most of the non-wilderness lands in the Brooks Range (about 5.2 million acres or 2.1 million ha) and the lands between the existing Arctic Wilderness and the Porcupine River (about 2.9 million acres or 1.2 million ha) in the Porcupine Plateau for wilderness designation. The "1002" coastal plain, lands along Old John Lake, the lower Wind River, the Junjik River, and the East Fork of the Chandalar River, and lands south of the Porcupine River on the Porcupine Plateau, covering a total of about 3 million acres (1.2 million ha), would not be proposed for designation--these areas would be included as minimal management areas.^{a/} Table 10 in Chapter V indicates what uses would be permitted in the wilderness and non-wilderness portions of the refuge. Wilderness designation would provide long-term congressional protection to fish and wildlife habitats found in these areas of the refuge.

Impacts on Areas Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Public use, mining, and surface geologic studies would be the only allowed activities that could affect naturalness in the proposed wilderness area under the Alternative E scenario. The wilderness designation would have a negligible effect on public use in the refuge--the same type of users (e.g., hunters, hikers) and the level of intensity of use would be about the same in this alternative as in Alternative A. Public use is expected to continue to increase on the refuge, regardless of whether additional wilderness is designated, as more people learn about the refuge and its many recreational values. On the other hand, the remoteness and cost of reaching the refuge will limit the increase in use.

The projected increase in public use in the Atigun Gorge area, potentially one of the most popular areas in the proposed wilderness area, would have the same effects on naturalness as described under the Alternative A scenario. Increased littering, more campsites, and the presence of obvious trails would be expected, affecting a total area covering less than one acre (0.4 ha). This impact, however, would occur independently of the wilderness designation action--as noted above, public use is projected to increase in the scenario

^{a/}The "1002" coastal plain area would be managed as a minimal management area pending congressional action.

regardless of whether additional areas are designated as wilderness in the Arctic Refuge.

In the rest of the approximately 8.1-million-acre (3.3-million-ha) proposed wilderness area public use is projected to be relatively light: at most 300 floaters, 130 hunters, and 60 hikers are projected to use this area. Most area would not be visited by more than 20 groups per year. This level of use would not be expected to result in adverse impacts to naturalness.

The mining operation in the scenario would have the same effects on the landscape of the refuge as those noted under the Alternative B scenario. Mining would substantially alter the landscape of the refuge, including vegetation and fish and wildlife resources, at the immediate operation site, while noise impacts could displace wildlife up to a half mile radius from the project site--about a 500-acre (200-ha) area could be adversely affected. (See the description of biological effects of Alternative B.)

Surface geologic studies in this scenario would have the same effect on naturalness as noted under the Alternative A scenario: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple of hours.

2. Outstanding opportunities for solitude - The projected increase in public use would have the same effect on opportunities for solitude as described under the Alternative A scenario. In the Atigun Gorge area the chances of seeing another group would be highest during the first week of sheep hunting, the peak use period. The chances of seeing another group would increase about 160% relative to current use levels, particularly along the route into the gorge and the campsites along the river--the areas most likely where other groups would be seen. (It should be noted again that this impact would occur independently of the wilderness designation action--public use is expected to increase regardless of whether additional areas are designated as wilderness in the refuge.)

The projected increase in public use would not affect the rest of the proposed wilderness area. As noted above, public use is projected to be relatively light--less than 500 recreational users. Even areas with good access, such as the Sheenjek River, probably would be visited by no more than 20 groups per year. Most groups would not see or hear other groups in the same area with this low level of use.

The effect of the mining operation on refuge recreational users seeking solitude on the Porcupine Plateau in this scenario would be identical to that noted for the Alternative B scenario. The mining operation would have a negligible effect refuge-wide because of the small size of the affected area, and the small number of workers that would be in the refuge. The mining operation would eliminate opportunities for solitude in the area of operations, but this area is projected to receive no recreational use in the scenario.

The surface geologic studies in the scenario would have the same effect on solitude as noted under the Alternative A scenario: the chances of the field crew being seen or heard for more than a few minutes by other refuge visitors would be negligible.

3. Outstanding opportunities for primitive recreation - The projected increase in recreational use would have the same effects on opportunities for primitive recreation as described for Alternative A. The increase in use in the Atigun Gorge area would lower the quality of the recreational experience relative to the rest of the refuge that receives little use. However, visitors would continue to be able to recreate in an outstanding primitive setting, with no visitor services or facilities in the area. In the rest of the proposed wilderness area the projected level of recreational use in this scenario would not affect opportunities for primitive recreation.

The mining operation would have the same effects on primitive recreation opportunities as described under the Alternative B scenario. The mine would eliminate opportunities for primitive recreation within the project area, while noise from the operation would reduce the quality of the experience for a radius extending about half a mile (0.8 km) from the project site--about a 500-acre (200-ha) area could be adversely affected.

Surface geologic studies in the proposed wilderness area would have the same effect on opportunities for primitive recreation as noted under the Alternative A scenario. Visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of the sites where surface geologic studies occur.

4. Special Features - The proposed wilderness area has many special features, including the upper Wind, Ivishak and Sheenjek wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, Porcupine Lake, the ramparts of the Porcupine River, and the upper Coleen River.

The expected increase in public use in the Alternative E scenario would have the same effects on special features as described for Alternative A. Public use in the proposed wilderness area would be expected to be concentrated in only a few popular areas with good access, such as the Atigun Gorge. The increase in hunters and hikers generally would not be expected to affect the scenic/geologic and wildlife features in the Atigun Gorge. (One resource that may be adversely affected is the local sheep population. As noted under the Alternative A scenario the effect of the projected level of hunters on the local population is unknown.) Most other areas with special features probably would be visited by no more than 20 groups per year, which should not result in adverse impacts to the special features. The projected increase in sport hunting in the proposed wilderness area would result in additional caribou being harvested, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

The mining operation in this scenario would not occur in an area that is a special feature of the refuge. This use also would have a negligible effect on the Porcupine caribou herd, as caribou would not be present on the mining site when most of the mining activity would occur.

Surface geologic studies would not disturb the surface, and thus would be expected to have a negligible effect on the refuge's special features. No other uses are projected in the Alternative E scenario that would affect special features in the proposed wilderness area.

Conclusion - Wilderness designation would help maintain the naturalness, solitude, primitive recreation, and special features on about 8.1 million acres (3.3 million ha) in the Arctic Refuge. The increase in public use could adversely affect naturalness, and opportunities for solitude, and the quality of the primitive recreational experience in the Atigun Gorge (which also is one of the refuge's special features); impacts to wilderness values would occur in a cumulative area totaling one acre along the river during the first week of hunting. These impacts would occur, however, regardless of whether or not additional wilderness is designated in the refuge. The placer mine in the scenario would eliminate naturalness, solitude, and opportunities for primitive recreation in a 100-acre (40-ha) area, and reduce opportunities for solitude and the quality of the recreational experience in another surrounding area totaling no more than 5,800 acres (2,300 ha). The impacts in both of these areas would occur, however, regardless of whether or not additional wilderness is designated in the refuge.

Effect on the Level of Oil and Gas Activities

Under Section 1003 of the Alaska Lands Act all of the Arctic Refuge is closed to oil and gas leasing. Unless the statute is amended, designating additional wilderness in the refuge would have no effect on oil and gas leasing activities in the Arctic Refuge. Oil and gas studies could occur in designated wilderness, but motorized surface equipment generally would not be permitted--core drilling and seismic surveys would not be permitted (unless conducted under the provisions of Section 1010 of the Alaska Lands Act).

Conclusion - Surface geologic studies would be the only commercial oil and gas activity permitted on the proposed wilderness area. The wilderness proposal would preclude core drilling and seismic surveys on about 8.1 million acres (3.3 million ha) or 76% of the non-wilderness refuge lands (unless conducted under the provisions of Section 1010 of the Alaska Lands Act). The proposal would have no effect on oil and gas development as this use already is prohibited under law.

Effect on the Level of Mining Development

There are four active mining claims in the proposed wilderness area. On all of the claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. Mining of valid claims could occur in the proposed wilderness area under Section 304(c) of the Alaska Lands Act. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative E.

Although wilderness designation would not prevent mining of a valid claim in the refuge, the designation could affect the mining operation. "Reasonable" restrictions may be placed on access to reduce impacts to refuge wilderness values: the Service may specify the route(s) and method(s) of access across the wilderness area if the operator's desired route would cause significant adverse impacts (provided adequate and feasible access otherwise exists). The Service also would closely monitor the operation to ensure that impacts to adjacent refuge resources are minimized. As a result, the mining operation

would have less impact on wilderness values, but how much or what kind is difficult to project. The mining operation also could be more expensive and the operator would have less flexibility than might be the case in a non-wilderness area.

Conclusion - Under Section 304(c) of the Alaska Lands Act mining of valid claims is permitted throughout the Arctic Refuge, including designated wilderness areas. Wilderness designation would have a minimal effect on the mining of valid claims in the Arctic Refuge, although it could result in higher costs and less flexibility for the mining operation.

Effect on the Level of Commercial Timber Harvest Operations

Wilderness designation would preclude commercial timber harvest operations on the south slopes of the Brooks Range and much of the Porcupine Plateau boreal forest. In particular, wilderness designation would preclude this economic use on approximately 500,000 acres (202,000 ha) of mixed forest and closed needleleaf forest in the Porcupine River drainage--an area which may have some timber of commercial value. As a result, potential benefits to the local economy would be foregone.

Conclusion - The Alternative E wilderness proposal would preclude the possibility of commercial timber harvesting in the only portion of the refuge that may have timber of economic value.

Impacts on Areas Not Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Recreational use and surface geologic studies are the only activities in the Alternative E scenario that could affect the naturalness of the non-wilderness portion of the refuge. (There are 5 mining claims near the Wind River, but the scenario assumes these claims would not be developed.) Relatively little public use is projected in the southern areas not proposed for wilderness--less than 50 recreational users would be expected to visit the lower Wind River, Junjik River, East Fork of the Chandalar River, Old John Lake, and the area south of the Porcupine River. This level of use would not be expected to adversely affect naturalness.

Surface geologic studies in this scenario would have the same effect on naturalness as noted under the Alternative A scenario: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple of hours.

2. Outstanding opportunities for solitude - The projected increase in public use would not affect the areas not proposed for wilderness. As noted above, public use is projected to be very low--less than 50 recreational users. It is highly unlikely, with this level of use, that a group would see or hear another group in the same area.

The effect of the surface geologic studies on refuge recreational users seeking solitude in the southern portions of the refuge not proposed for wilderness in this scenario would be identical to that noted for the Alternative B scenario. These activities would have a negligible effect because of the small size of the affected areas, and the small number of workers that would be in the refuge. The chances of the geologic studies field crew being seen or heard for more than a few minutes by other refuge visitors would be negligible.

3. Outstanding opportunities for primitive recreation - Less than 50 recreational users are projected to visit the southern portions of the refuge not proposed for wilderness. This low level of recreational use would not affect opportunities for primitive recreation.

Surface geologic studies also would not affect opportunities for primitive recreation--visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of the sites where surface geologic studies occur.

4. Special features - The only identified special features in the areas not proposed for wilderness are the lower Wind Wild River, Old John Lake and the Porcupine caribou herd.

Less than 50 recreational users are projected to visit the southern portions of the refuge not proposed for wilderness. This low level of recreational use would not adversely affect the special features. A few caribou may be harvested by sport hunters in this scenario, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

Surface geologic studies would not disturb the surface, and thus would be expected to have a negligible effect on the refuge's special features.

Conclusion - The management actions in the Alternative E scenario would have a negligible effect on the wilderness values in the southern portions of the refuge not proposed for wilderness--naturalness, solitude, opportunities for primitive recreation, and special features of the refuge generally would be maintained in this alternative. The projected level of recreational use and surface geologic studies would have a negligible effect on wilderness values.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

The Alaska Lands Act and existing Service policies would continue to govern what oil and gas activities occur in the southern portions of the refuge not proposed for wilderness designation. Oil and gas studies could occur in this area (about 1.5 million acres or 607,000 ha). The Alternative E scenario assumes that only surface geologic studies would occur. No oil and gas production would occur because under Section 1003 of the Alaska Lands Act (assuming it is not amended) all of the Arctic Refuge is closed to oil and gas production.

Conclusion - Alternative E would have no effect on the level of oil and gas activities in the areas not proposed for wilderness designation.

Effect on the Level of Mining Development

There are five active mining claims on lands near the lower Wind River not proposed for wilderness. On these claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. Mining of valid claims could occur in the refuge under Section 304(c) of the Alaska Lands Act. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative E. (The mining development considered in the scenario is in the proposed wilderness area.)

Conclusion - Alternative E would have no effect on the level of mining in the areas not proposed for wilderness designation.

Effect on the Level of Commercial Timber Harvesting

Under Alternative E all of the areas not designated or proposed for wilderness would be designated as minimal management or wild river management areas. Commercial timber harvesting would not be permitted in these management categories.

Conclusion - Alternative E would preclude commercial timber harvesting in the areas not proposed for wilderness designation.

ALTERNATIVE F

The scenarios developed for Alternative F assume economic development would not occur on refuge lands on the south side of the Brooks Range, with the exception of mineral development (hardrock mining). The Alternative F scenario projects current public use levels into the future, assuming more people seeking a wilderness experience continue to be attracted to the refuge (and not because of any actions the Service takes); the remoteness and high cost of reaching the refuge, however, would limit the expected increase in public use.

Public Use Scenario

In the Alternative F scenario the Service would continue to manage public use in the refuge as it has in the past. All of the assumptions described for the Alternative A scenario (e.g., popular use areas, proportions of different recreational uses, seasons and bag limits) would be the same for this scenario. Thus, the recreational use levels in the Alternative F scenario would be the same as described in the Alternative A scenario.

In the Alternative F scenario aircraft access would not be limited. It is assumed in this scenario that the aircraft use levels in the Firth River-Mancha Creek area would be the same in the Alternative F scenario as in the Alternative A scenario.

Development Scenario

In the Alternative F scenario hardrock mining would be the only economic use that would occur on refuge lands in the year 2000. Oil and gas leasing and production, commercial timber harvesting would not occur in this scenario (see below).

Commercial Timber Operation

In Alternative F all of the refuge lands would be designated either as wilderness, minimal management, or wild river management areas. Commercial timber operations would not be permitted in the refuge in the future under any of these management categories. For the purposes of analysis it is therefore assumed that commercial timber operations would not occur on the refuge over the next 50 years.

Mining

Wilderness designation would not preclude the development of existing mining claims on the Arctic Refuge. The Alternative F scenario assumes that a placer mining operation for gold recovery would be developed on refuge lands near the Christian River. The mining scenario for this operation, including the development assumptions, is the same as described in the Alternative B scenario.

Oil and Gas Activities

In Alternative F, geologic studies, including surface rock collection, gravimetric surveying and geological mapping activities, could be permitted on a site-specific basis throughout the refuge. Seismic surveying and subsurface core drilling could be permitted in the non-wilderness portions of the refuge south of the "1002" area. Limited oil and gas studies could be permitted in the wilderness area and wild river corridors. Under Section 1003 of the Alaska Lands Act, all of the Arctic Refuge is closed to oil and gas leasing and production. For the purposes of analysis it is assumed that only surface geologic studies would occur south of the "1002" coastal plain area for the next 50 years. The scenario for surface geologic studies, including the assumptions, is the same as described in the Alternative A scenario. Seismic surveying and core drilling would not occur because of the expense involved in field work and the likelihood that companies would conduct these studies only on lands available for oil and gas development.

Biological Effects of Alternative F (Life of the Plan 15 Years)

Vegetation

This alternative would have the same negligible effect on vegetation as described for Alternative A--the projected refuge uses in Alternative F would not be expected to significantly alter vegetation.

Fish

Alternative F would have the same effect on the refuge's fish populations as described for Alternatives C through E. The projected level of public use on refuge lands and surface geologic studies would have negligible effects on refuge fishery resources. Placer mining along a small tributary of the Christian River would have a major, long-term adverse impact on local fish populations and habitats. From a refuge-wide perspective, Alternative F would have a negligible impact on anadromous and resident fish populations in the Arctic Refuge.

Waterfowl

Alternative F would have the same negligible effects on the refuge's waterfowl populations as Alternatives C, D and E. The projected level of public use and surface geologic studies would not significantly affect waterfowl populations, while the placer mining operation assumed in the scenario would have a negligible effect on waterfowl populations.

Shorebirds

Alternative F would have the same negligible effects on shorebirds as Alternatives C, D and E. The public use level projected and surface geologic studies would not be expected to alter shorebird distributions or numbers. Placer mining would have a negligible effect on refuge shorebird populations.

Raptors

The Alternative F scenario would have the same effect on the refuge's raptor populations as Alternatives C, D and E. Increasing recreational use of river corridors could have a minor impact on refuge raptors if disturbances during the early summer result in nest abandonment or displacement into less suitable habitats during courtship. Placer mining and surface geologic studies would have a negligible impact on refuge raptor populations.

Marine Mammals

Alternative F would have the same negligible impact on Arctic Refuge's marine mammal populations as described for the previous alternatives.

Caribou

Alternative F would have a negligible effect on the refuge's caribou population, the same as Alternatives C, D and E. The level of public use and surface geologic studies in this scenario would not be expected to significantly affect the refuge's caribou. Placer mining would have a negligible effect--only highly localized, short-term displacement of animals would occur.

Moose

The impact of Alternative F on moose would be identical to that described for Alternatives C, D and E. The level of recreational use described in the scenario would not adversely affect refuge moose. Placer mining would displace moose to adjacent areas, but would have negligible impacts on refuge moose populations. Surface geologic studies would have a negligible effect on moose. Overall, Alternative F would have a negligible impact on the refuge's moose population.

Dall Sheep

The level of public use, mining, and surface geologic studies in the Alternative F scenario would have the same negligible effect on the refuge's Dall sheep population as described for Alternatives C, D and E.

Muskox

The Alternative F scenario would have the same negligible impact on refuge habitats and muskox population as noted for Alternatives C, D, and E.

Brown and Black Bear

The projected level of public use in Alternative F could result in slightly increased numbers of human/bear conflicts and bear killed in defense of life and property. Placer mining would have little effect on black and brown bear populations, although again some bear could be shot in defense of life and property. Surface geologic studies would have a negligible effect on refuge bear populations. Overall, the public and economic uses in Alternative F would have a negligible effect on the refuge's bear populations.

Furbearers

The level of public use, the placer mine, and surface geologic studies in the Alternative F scenario would be expected to have the same negligible effect on refuge furbearer populations and their habitats as noted for Alternatives C, D, and E.

Threatened and Endangered Species

The level of recreational use projected in the Alternative F scenario would not affect the refuge's threatened and endangered species, with the possible exception of American and arctic peregrine falcons. The American peregrine falcon nests on the Porcupine River cliffs, and the arctic peregrine falcon may nest on rivers on the north slope which refuge users float. The projected level of recreational use in this scenario would have the same potential impacts as described under Alternative A. Breeding raptors generally are very sensitive to disturbance. Reproductive success would be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers known to sustain peregrine nests at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor the peregrines and river use to ensure that impacts are avoided.

No threatened or endangered species are known to occur in the placer mining site in the scenario. No other activities are proposed under the Alternative F scenario that would affect the refuge's threatened or endangered species.

Water Quality and Quantity

Alternative F would have the same effects on water quality and quantity as Alternatives D and E. Minor, localized impacts to water quality could occur from recreational users on popular rivers and lakes, particularly at regularly used campsites; refuge water quantities would not be affected. Placer mining would have major long-term impacts on the water quality and quantity within the drainage where mining activities occurred, but the small-scale operation described in the scenario would have a negligible impact on water quality and quantity in the refuge as a whole. Surface geologic studies would not affect water quality and quantity. Thus, Alternative F would have a negligible effect on the refuge's overall water quality and quantity, with minor to major localized impacts possible due to public use and mining.

Air Quality

The Alternative F scenario would have the same negligible effects on refuge air quality as noted for Alternatives C, D, and E.

Ecosystems

Alternative F would have the same negligible effects on refuge ecosystems and natural diversity as described for Alternatives C, D and E. The level of public use and surface geologic studies projected in the scenario would have a negligible impact on refuge ecosystems and natural diversity. Placer mining would have a moderate impact on the ecosystems in the immediate area surrounding the claim site, but would have a negligible impact on natural diversity and ecosystems throughout the rest of the refuge.

Socioeconomic Effects of Alternative F (Life of the Plan 15 Years)

Population

Alternative F would have the same negligible effect on the population of the local communities as described for Alternatives C, D and E. The small mining operation, the surface geologic studies, and the increase in public use in the scenario would have a negligible effect on the local population.

Economy

Mining, surface geologic studies, and the projected increase in public use in this scenario would have negligible positive benefits for the local economy.

Subsistence/Section 810(a) Evaluation and Finding

The Alternative F scenario would have the same effect on subsistence users and the resources they use as discussed for Alternative C, D and E. This scenario would not affect the subsistence needs of local residents. Subsistence activities would continue to be an important part of many local residents' lives.

The projected mining operation, the surface geologic studies, and the level of public use described in the scenario would be expected to result in a negligible to minor effect on the refuge's fish and wildlife populations. Some animals may be displaced to other areas by the mining operation, but local residents probably could find adequate resources in nearby areas. The expected increases in harvest levels resulting from the increase in recreational use would not be expected to adversely affect subsistence users, although competition between local residents and recreational users for resources could increase in popular areas that have relatively good access, such as the Hulahula River. The Alaska Department of Fish and Game and the Service would monitor use levels to ensure that opportunities for subsistence harvests are maintained.

The most significant adverse impact of the Alternative F scenario probably would be the perception of Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents that more "outsiders" are intruding on their way of life, reducing opportunities for subsistence activities. In addition to the increase in recreational users, in this alternative a mining operation and surface geologic studies would be occurring in the refuge. With more aircraft and boats in the refuge, and a higher potential for seeing people, local residents would likely grow concerned that their subsistence way of life is being threatened.

Availability of Other Lands - As noted in the Section 810(a) evaluation for Alternative A, there may be other lands available for the uses considered, but lands outside of the refuge are not considered because they are beyond the scope of this plan. The Alternative F public use scenario focused on existing and potential popular recreational use areas. There are other areas within the refuge that could provide opportunities for similar use, but they have not been identified by the Service.

The mining operation considered in the scenario is a site-specific project. There are only a few active claims in the Arctic Refuge where a mine could be developed. Whether these claims are developed depends on the resources, and the economics of developing a particular site.

Other Alternatives - Seven management alternatives were developed for the Arctic Refuge plan. Five of the alternatives do not provide for new economic uses in the refuge; two of the alternatives provide for new economic uses. All of the alternatives would permit increased recreational use of the refuge if it is compatible with refuge purposes, although Alternative G would limit the increase to protect the refuge's wilderness values.

Findings - Under the Alternative F scenario additional public use, mining, and surface geologic studies are projected to occur. Concerns of local residents about impacts to their way of life may intensify with these uses. All of the potential impacts that would result from the Alternative F scenario would be localized. None of the projected uses in the scenario would adversely affect subsistence fish and wildlife population levels, although some negligible to minor impacts could occur (e.g., wildlife may be displaced in the mining area of operations). The mining operation could displace some local residents from an area where they occasionally hunt and trap, but other nearby areas probably could be used for subsistence activities. Increased harvest levels would occur with the increase in sport hunting and fishing, but sufficient resources would be available to meet subsistence user needs. It also should be noted that both the Service and the State of Alaska would take steps to ensure that opportunities for subsistence harvests are maintained. The Service thus concludes that Alternative F would not result in significant restrictions to subsistence uses on the Arctic Refuge.

Recreation

The Alternative F scenario generally would have the same negligible effect on recreational use as described for Alternative A. The mining operation and surface geologic studies in the scenario would have a negligible effect on recreational use. The projected increase in recreational use may result in increased competition, perceived crowding, and other recreational user conflicts in popular areas. In particular, some sheep hunters, hikers and floaters seeking solitude may perceive the Atigun Gorge area, the Peters/Schrader lakes area, and the Hulahula and Sheenjek drainages to be overcrowded. The increase in competition for resources in the Atigun Gorge area eventually may require the Service to propose regulations to the Alaska Department of Fish and Game and the Board of Game to limit harvests and/or restrict use levels.

Cultural Resources

Alternative F would have the same negligible effect on cultural resources as described for Alternatives C, D and E. Some damage to sites may occur incidental to subsistence activities and increased recreational use levels. The highest potential for damage occurring would be at camping sites because of the possibility that these sites were used in the past. Surface geologic studies would not be expected to adversely affect refuge cultural resources. The mining operation has some potential to damage archaeological and historic sites. These potential impacts largely would be avoided by completing cultural resource inventories and evaluations, and through the use of mitigation or preservation measures.

Wilderness Designation Effects of Alternative F

In Alternative F the Service would propose most of the non-wilderness lands in the Brooks Range, (about 5.2 million acres or 2.1 million ha) and the Porcupine Plateau (about 3.7 million acres or 1.5 million ha) for wilderness designation. Only the "1002" coastal plain, lands around Old John Lake, and lands along the lower Wind River, Junjik River, and the East Fork of the Chandalar River, covering a total of about 2.2 million acres (915,000 ha), would not be proposed for wilderness designation.^{a/} Table 10 in Chapter V indicates what uses would be permitted in the wilderness and non-wilderness portions of the refuge. Wilderness designation would provide long-term congressional protection to fish and wildlife habitats found in these areas of the refuge.

Impacts on Areas Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Public use, mining, and surface geologic studies would be the only allowed activities which could affect naturalness in the proposed wilderness area under the Alternative F scenario. Public use is expected to continue to increase on the refuge in Alternative F, regardless of whether additional wilderness is designated, as more people learn about the refuge and its many recreational values--the increase in use, including the type of users and the intensity of use, would be the same in this alternative as in Alternative A.

The projected increase in public use in the Atigun Gorge area, potentially one of the most popular areas in the proposed wilderness area, would have the same effects on naturalness as described under the Alternative A scenario. Increased littering, more campsites, and the presence of obvious trails would be expected in this area, affecting a total cumulative area of not more than one acre (0.4 ha). This impact would occur, however, regardless of whether additional areas are designated as wilderness in the Arctic Refuge.

^{a/}The "1002" coastal plain area would be managed as a minimal management area pending congressional action.

In the rest of the approximately 8.9 million acres (3.6 million ha) proposed for wilderness designation, recreational use is projected to be relatively light: at most 60 hikers, 300 floaters, and 150 hunters are projected to use this area. Even areas with good access, such as the Sheenjek River, probably would be visited by no more than 20 groups per year. This level of use would not be expected to result in measurable adverse impacts to naturalness.

The mining operation in the scenario would have the same impacts as described for the four previous alternatives: the landscape of the refuge, including vegetation and fish and wildlife resources, would be altered at the immediate operation site, but impacts beyond a radius of about half a mile from the project site would be negligible--biological impacts would be limited to about a 500-acre (200-ha) area around the mine. Wilderness designation would have little effect on the impacts of this use--mining of a valid claim would alter the naturalness of the area regardless of whether or not the area is designated as wilderness.

Surface geologic studies would have the same negligible effects on refuge resources as described in Alternative A: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple hours.

2. Outstanding opportunities for solitude - The projected increase in public use would have the same effect on opportunities for solitude as described under the Alternative A scenario. In the Atigun Gorge area the chances of seeing another group would be highest during the first week of sheep hunting, the peak use period. The chances of seeing another group would increase about 160% relative to current use levels, particularly along the route into the gorge and the campsites along the river--the areas most likely where other groups would be seen. (It should be noted again that this impact would occur regardless of whether additional areas are designated as wilderness in the refuge.)

In the rest of the areas proposed for wilderness designation, public use is projected to be relatively light--about 510 recreational users. Public use would be expected to occur primarily in areas with good access, such as the Sheenjek and Porcupine rivers. Most areas would not be visited by more than 20 groups, spread out over the summer and early fall. It is unlikely, with this low level of use, that a group would see or hear another group in the same area.

The effect of the mining operation would be identical to that noted for the Alternative B scenario. Visual impacts of the operation would cover a maximum of 100 acres (40 ha). Noise from the machinery could be heard no more than 9 square miles (23-km²) from the mining site--up to 5,800 acres (2,300 ha) could be impacted. However, the mining operation would be expected to have a negligible effect on the solitude of refuge users because the site is not located in a popular recreational use area.

Surface geologic studies in this scenario would have the same effect on solitude as described for the Alternative A scenario. The chances of other refuge users seeing or hearing these studies would be very low--the large size of the area (about 8.9 million acres (3.6 million ha)) makes it unlikely that the few recreational users in this area (about 510 recreational users over the year) would encounter the field crew. Furthermore, most recreational use would occur along rivers, while the surface geologic studies would occur over a much larger area that receives little if any use due to the lack of access.

3. Outstanding opportunities for primitive recreation - The projected increase in recreational use would have the same effects on opportunities for primitive recreation as described for Alternative A. The increase in use in the Atigun Gorge area would lower the quality of the recreational experience relative to the rest of the refuge that receives little use. However, visitors would continue to be able to recreate in an outstanding primitive setting, with no visitor services or facilities in the area.

The mining operation in this scenario would have the same effect as described for the Alternative B scenario. The mine is not located at a site known to have outstanding primitive recreation qualities, so no visitors would be expected to come to this area. Opportunities for primitive recreation would be eliminated in an area up to 100 acres (40 ha), while visual impacts, noise, and displacement of game animals would reduce the quality of the primitive recreation in a 9-square-mile (23-km²) area, covering 5,800 acres (2,300 ha), around the mining site.

Surface geologic studies in this scenario would have the same effect on opportunities for primitive recreation as noted under the Alternative A scenario. Visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of the sites where surface geologic studies occur.

4. Special features - The areas proposed for wilderness designation have many special features, including the upper Wind, Ivishak and Sheenjek wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, Porcupine Lake, the ramparts of the Porcupine River, and the upper Coleen River.

The expected increase in public use in the Alternative F scenario would have the same effects on special features as described for Alternative A. Public use in the refuge would be expected to be concentrated in areas with good access, such as the Atigun Gorge. The increase in hunters and hikers generally would not be expected to affect the scenic/geologic and wildlife features in the Atigun Gorge. (One resource that may be adversely affected is the local sheep population. As noted under the Alternative A scenario the effect of the projected level of hunters on the local population is unknown.) Most other areas with special features probably would be visited by no more than 20 groups per year, which should not result in adverse impacts to the special features. The projected increase in sport hunting in the proposed wilderness area would result in additional caribou being harvested, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

The mining operation in this scenario would not occur in an area that is a special feature of the refuge. This use also would have a negligible effect on the Porcupine caribou herd, as caribou would not be present on the mining site when most of the mining activity would occur.

Surface geologic studies would not disturb the surface, and thus would be expected to have a negligible effect on the refuge's special features.

Conclusion - Wilderness designation would help maintain the naturalness, solitude, primitive recreation, and special features on about 8.9 million acres (3.6 million ha) in the Brooks Range and the Porcupine Plateau boreal forest of the Arctic Refuge. The increase in public use could adversely affect perceived naturalness, and opportunities for solitude, and the quality of the primitive recreational experience in the Atigun Gorge (which also is one of the refuge's special features); impacts to wilderness values would primarily occur in a cumulative area totaling one acre along the river during the first week of hunting. The placer mine in the scenario would eliminate naturalness, solitude, and opportunities for primitive recreation in a 100-acre (40-ha) area, and reduce opportunities for solitude and the quality of the recreational experience in another surrounding area totaling no more than 5,800 acres (2,300 ha). The impacts in both of these areas would occur, however, regardless of whether or not additional wilderness is designated in the refuge.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

Under Section 1003 of the Alaska Lands Act all of the Arctic Refuge is closed to oil and gas leasing. Unless the statute is amended, designating additional wilderness in the refuge would have no effect on oil and gas leasing activities in the Arctic Refuge. Oil and gas studies could occur in the designated wilderness, but motorized surface equipment generally would not be permitted. The wilderness proposal would specifically preclude core drilling and seismic surveys on about 8.9 million acres (3.6 million ha) or 79% of the non-wilderness refuge lands (unless conducted under the provisions of Section 1010 of the Alaska Lands Act).

Conclusion - The Alternative F wilderness proposal would preclude most oil and gas studies using motorized surface equipment in about 8.9 million acres of the refuge. The proposal would have no effect on oil and gas production as this use already is prohibited under law.

Effect on the Level of Mining Development

There are four active mining claims in the area proposed for wilderness designation in Alternative F. Mining of valid claims could occur throughout the refuge under Section 304(c) of the Alaska Lands Act. On all of the claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative F.

Although wilderness designation would not prevent mining of a valid claim in the refuge, the designation could affect the mining operation. "Reasonable" restrictions may be placed on access to reduce impacts to refuge wilderness values: the Service may specify the route(s) and method(s) of access across the wilderness area if the operator's desired route would cause significant adverse impacts (provided adequate and feasible access otherwise exists). The Service also would closely monitor the operation to ensure that impacts to

adjacent refuge resources are minimized. As a result, the mining operation would have less impact on wilderness values, but how much or what kind is difficult to project. The mining operation also could be more expensive and the operator would have less flexibility than might be the case in a non-wilderness area.

Conclusion - Under Section 304(c) mining of valid claims is permitted throughout the Arctic Refuge, including designated wilderness areas. Although the Alternative F wilderness proposal would not prevent the mining of valid claims in the Arctic Refuge, it could result in higher costs and less flexibility for the mining operation.

Effect on the Level of Commercial Timber Harvest Operations

Wilderness designation would preclude commercial timber harvest operations on the south slopes of the Brooks Range and the Porcupine Plateau boreal forest. In particular, wilderness designation would preclude this economic use on approximately 500,000 acres (202,000 ha) of mixed forest and closed needleleaf forest in the Porcupine River drainage--an area which may have some timber of commercial value. As a result, potential benefits to the local economy would be foregone.

Conclusion - The Alternative F wilderness proposal would preclude the possibility of commercial timber harvesting in the only portion of the refuge that may have timber of economic value.

Impacts on Areas Not Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Recreational use and surface geologic studies are the only activities in the Alternative F scenario that could affect the naturalness of the non-wilderness portion of the refuge. (There are 5 mining claims near the Wind River, but the scenario assumes these claims would not be developed.) Relatively little public use is projected in the southern areas not proposed for wilderness--less than 50 recreational users would be expected to visit the lower Wind River, Junjik River, the East Fork of the Chandalar River, and Old John Lake. This level of use would not be expected to adversely affect naturalness.

Surface geologic studies in this scenario would have the same effect on naturalness as noted under the Alternative A scenario: this activity results in essentially no surface disturbance, and would not affect any site for more than a couple of hours.

2. Outstanding opportunities for solitude - The projected increase in public use would not affect the areas not proposed for wilderness. As noted above, public use is projected to be very low--less than 50 recreational users. It is highly unlikely, with this level of use, that a group would see or hear another group in the same area.

The effect of the surface geologic studies on refuge recreational users seeking solitude in the southern portions of the refuge not proposed for wilderness in this scenario would be identical to that noted for the Alternative B scenario. These activities would have a negligible effect because of the small size of the affected areas, and the small number of workers that would be in the refuge. The chances of the geologic studies field crew being seen or heard for more than a few minutes by other refuge visitors would be negligible.

3. Outstanding opportunities for primitive recreation - Less than 50 recreational users are projected to visit the southern portions of the refuge not proposed for wilderness. This low level of recreational use would not affect opportunities for primitive recreation.

Surface geologic studies also would not affect opportunities for primitive recreation--visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of the sites where surface geologic studies occur.

4. Special features - The only identified special features in the areas not proposed for wilderness are the lower Wind Wild River, Old John Lake and the Porcupine caribou herd.

Less than 50 recreational users are projected to visit the southern portions of the refuge not proposed for wilderness. This low level of recreational use would not adversely affect the special features. A few caribou may be harvested by sport hunters in this scenario, but the Porcupine caribou herd should sustain this harvest with no adverse effect.

Surface geologic studies would not disturb the surface, and thus would be expected to have a negligible effect on the refuge's special features.

Conclusion - The management actions in the Alternative F scenario would have a negligible effect on the wilderness values in the southern portions of the refuge not proposed for wilderness--naturalness, solitude, opportunities for primitive recreation, and special features of the refuge generally would be maintained in this alternative. The projected level of recreational use and surface geologic studies would have a negligible effect on wilderness values.

Effect on the Level of Oil and Gas Activities South of the "1002" Area

The Alaska Lands Act and existing Service policies would continue to govern what oil and gas activities occur in the southern portions of the refuge not proposed for wilderness designation. Oil and gas studies could occur in this area (about 760,000 acres or 307,000 ha). The Alternative F scenario assumes that only surface geologic studies would occur. No oil and gas production would occur because under Section 1003 of the Alaska Lands Act (assuming it is not amended) all of the Arctic Refuge is closed to oil and gas production.

Conclusion - Alternative F would have no effect on the level of oil and gas activities in the areas not proposed for wilderness designation.

Effect on the Level of Mining Development

There are five active mining claims on lands near the lower Wind River not proposed for wilderness. On these claims activity necessary for annual assessments, as prescribed in the Mining Law of 1872 (\$100 of expenditures per claim), would be expected to occur. Mining of valid claims could occur in the refuge under Section 304(c) of the Alaska Lands Act. However, based on the high cost of access into the areas and developing the mines, only one active claim is projected to be developed during the next 50 years in the scenario for Alternative F. (The mining development considered in the scenario is in the proposed wilderness area.)

Conclusion - Alternative F would have no effect on the level of mining in the areas not proposed for wilderness designation.

Effect on the Level of Commercial Timber Harvesting

Under Alternative F all of the areas not designated or proposed for wilderness would be designated as minimal management or wild river management areas. Commercial timber harvesting would not be permitted in these management categories.

Conclusion - Alternative F would preclude commercial timber harvesting in the areas not proposed for wilderness designation.

ALTERNATIVE G

The scenarios developed for Alternative G assume economic development would not occur on refuge lands on the south side of the Brooks Range. The Alternative G scenario assumes that all of the special provisions intended to protect the refuge's wilderness qualities would be implemented--it is assumed that Congress approves all of the major management actions proposed in this alternative when it designates the new wilderness area.

Public Use Scenario

In the Alternative G scenario more people seeking a wilderness experience would continue to be attracted to the refuge (not because of any actions the Service takes). All of the assumptions described for the Alternative A scenario (e.g., popular use areas, proportions of different recreational uses, seasons and bag limits) would be the same for this scenario. It is assumed in this scenario that over the next 10 to 15 years public use would grow slowly due to the remoteness and high cost of reaching the refuge--in most of the refuge use levels would not exceed identified carrying capacity limits. Consequently, in the Alternative G scenario the Service would generally continue to manage public use in the refuge as it has in the past. The recreational use levels in the Alternative G scenario would be the same as described in the Alternative A scenario for all of the float trips, and for the Peters-Schrader Lakes and Caribou Pass areas.

Under the Alternative G scenario the Service would take action to limit public use to protect the refuge's wilderness values in two popular areas. Use of the Hulahula River and Atigun Gorge areas may exceed carrying capacity limits and adversely affect refuge wilderness values. In these areas in this scenario the Service would restrict the number of hikers and hunters to protect refuge wilderness values. For purposes of analysis it is assumed that the Service would limit the number of groups using the Hulahula River to 8 guided hunting groups (24 hunters) and 18 unguided hunting groups (54 hunters). In the Atigun Gorge area the Service would limit the number of groups to 4 guided hunting groups (12 hunters), 10 unguided hunting groups (30 hunters), 4 guided hiking groups (24 hikers), and 16 unguided hiking groups (64 hikers). It is assumed in the scenario that guided and unguided hunters and hikers who could not go to the Hulahula River and Atigun Gorge areas would go to other areas in the refuge.

In the Alternative G scenario aircraft access also would be limited to maintain wilderness experience opportunities. The Firth River-Mancha Creek area has been identified as an area that receives little aircraft access, and in which aircraft access could be limited. It is assumed in this scenario, for purposes of analysis, that airplanes would only be allowed to land in two areas. One site would be near the Firth River, and the other would be on Mancha Creek.

Development Scenario

Alternative G is intended to maximize protection to the refuge's wilderness qualities, maximize protection of the refuge's fish and wildlife populations and habitats in their natural diversity, and maintain high quality opportunities for subsistence, trapping, and recreational activities; economic

uses would be highly restricted. Thus, in the Alternative G scenario economic activities and developments generally would not be permitted (with the exceptions of guiding, outfitting and mining of valid claims). It is assumed in this scenario that Congress would approve this action.

Commercial Timber Operation

In Alternative G most of the refuge lands would be designated as wilderness areas. Commercial timber operations would not be permitted in the refuge in the future under this management category. For the purposes of analysis it is therefore assumed that commercial timber operations would not occur on the refuge over the next 50 years.

Mining

Wilderness designation would not preclude the development of existing mining claims on the Arctic Refuge. For purposes of analysis it is assumed in the Alternative G scenario that no mining would occur in the refuge over the next 50 years. Only that activity necessary for annual assessments, as prescribed in the Mining Law of 1872, is assumed to occur. One trip to a claim during a season would cover the required assessment outlay. This assessment work must occur every year to keep the claims active.

Oil and Gas Activities

In the Alternative G scenario, geologic studies for scientific purposes could be permitted on a site-specific basis throughout the refuge. No oil and gas related activities, including seismic surveys and core drilling, would be permitted in the refuge (excluding the "1002" area). Under Section 1003 of the Alaska Lands Act, all of the Arctic Refuge is closed to oil and gas leasing and production. For the purposes of analysis it is assumed in the scenario that only surface geologic studies for scientific purposes would occur south of the "1002" coastal plain area for the next 50 years. The scenario for surface geologic studies, including the assumptions, is the same as described in the Alternative A scenario.

Biological Effects of Alternative G (Life of the Plan - 15 Years)

Vegetation

This alternative would have the same negligible effect on vegetation as described for Alternative A--the projected refuge uses in the Alternative G scenario would not be expected to significantly alter vegetation.

Fish

The Alternative G scenario would have the same effect on the refuge's fish populations as described for the Alternative A scenario. The projected level of public use on refuge lands, surface geologic studies, and the annual assessment work on existing mining claims within the refuge would have a negligible impact on anadromous and resident fish populations in the Arctic Refuge.

Waterfowl

The Alternative G scenario would have the same effects on the refuge's waterfowl populations as noted for the Alternative A scenario. The projected level of public use, annual assessment work, and surface geologic studies would not significantly affect waterfowl populations.

Shorebirds

The Alternative G scenario would have the same effects on shorebirds as noted for the Alternative A scenario. The public use level projected, surface geologic studies, and the annual assessment work on existing mining claims within the refuge would not be expected to alter shorebird distributions or numbers.

Raptors

The Alternative G scenario would have the same effect on the refuge's raptor populations, as described for Alternative A. Increasing recreational use of river corridors could have a minor impact on refuge raptors if disturbances during the early summer result in nest abandonment or displacement into less suitable habitats during courtship. The annual assessment work on existing mining claims within the refuge, and surface geologic studies would have a negligible impact on refuge raptor populations.

Marine Mammals

The Alternative G scenario would have the same negligible impact on Arctic Refuge's marine mammal populations as described for the previous alternatives.

Caribou

The Alternative G scenario would have the same effect on the refuge's caribou population as described for the Alternative A scenario. The projected level of public use, surface geologic studies, and the annual assessment work on existing mining claims within the refuge in this scenario would not be expected to significantly affect the refuge's caribou.

Moose

The impact of Alternative G on moose would be identical to that described for Alternative A. The level of recreational use described in the scenario would not adversely affect the refuge's moose. Surface geologic studies and the annual assessment work on existing mining claims within the refuge would have a negligible effect on moose. Overall, Alternative G would have a negligible impact on the refuge's moose population.

Dall Sheep

The level of public use, surface geologic studies, and annual mining claim assessment work described in the Alternative G scenario would have the same negligible effect on the refuge's Dall sheep population as described for the Alternative A scenario.

Muskox

The level of public use, surface geologic studies and annual mining claim assessment work in the Alternative G scenario would have the same negligible impact on the refuge's muskox population as noted for the Alternative A scenario.

Brown and Black Bear

The projected level of public use in Alternative G could result in slightly increased numbers of human/bear conflicts and bear killed in defense of life and property. Surface geologic studies and the annual assessment work on existing mining claims within the refuge would have a negligible effect on refuge bear populations. Overall, the Alternative G scenario would have a negligible effect on the refuge's bear populations.

Furbearers

The level of public use, annual assessment work on existing mining claims, and surface geologic studies in the Alternative G scenario would be expected to have the same negligible effect on refuge furbearer populations and their habitats as noted for the Alternative A scenario.

Threatened and Endangered Species

The level of recreational use projected in the Alternative G scenario would not affect the refuge's threatened and endangered species, with the possible exception of American and arctic peregrine falcons. The American peregrine falcon nests on the Porcupine River cliffs, and the arctic peregrine falcon may nest on rivers on the north slope which refuge users float. The projected level of recreational use in this scenario would have the same potential impacts as described under Alternative A. Breeding raptors generally are very sensitive to disturbance. Reproductive success would be lowered if adult peregrines desert established use areas. Disturbance of specific falcon nesting cliffs can be prevented by parties avoiding those areas during the early summer. The Service would encourage groups to float rivers known to sustain peregrine nests at other times. All groups also would be encouraged to avoid camping in areas where peregrines are known to nest. Even if all the groups floated the Porcupine River in early summer (which would be unlikely), the 12 groups projected in the scenario would be expected to have a minor to negligible effect on peregrine nesting (provided the people did not climb up the river cliffs or camp in the immediate vicinity of active nests). The Service would monitor the peregrines and river use to ensure that impacts are avoided.

No other activities are included under the Alternative G scenario that would affect the refuge's threatened or endangered species.

Water Quality and Quantity

The Alternative G scenario would have the same effects on water quality and quantity as described for the Alternative A scenario. Minor, localized impacts to water quality could occur from recreational users on popular rivers and lakes, particularly at regularly used campsites, due to improperly buried

wastes. Refuge water quantities would not be affected. Surface geologic studies and the annual assessment work on mining claims would not noticeably affect water quality and quantity. Thus, Alternative G would have a negligible effect on the refuge's overall water quality and quantity.

Air Quality

The public and economic uses in the Alternative G scenario would have the same negligible effects on refuge air quality as noted for the Alternative A scenario.

Ecosystems

The Alternative G scenario would have the same effects on refuge ecosystems and natural diversity as described for the Alternative A scenario. The level of public use, surface geologic studies, and annual assessment work on mining claims projected in the scenario would have a negligible impact on refuge ecosystems and natural diversity.

Socioeconomic Effects of Alternative G (Life of the Plan - 15 Years)

Population

The Alternative G scenario would have the same effect on the population of the local communities as described for the Alternative A scenario. The annual assessment work on mining claims, the surface geologic studies, and the projected level of public use in the scenario would have a negligible effect on the local population.

Economy

The surface geologic studies, annual assessment work on mining claims, and projected level of recreational use in the scenario would have negligible benefits for the local economy, the same as noted for the Alternative A scenario.

Subsistence/Section 810(a) Evaluation and Finding

The Alternative G scenario would have the same effect on subsistence users and the resources they use as discussed for Alternative A. This scenario would not affect the subsistence needs of local residents. Subsistence activities would continue to be an important part of many local residents' lives.

The surface geologic studies, annual assessment work on mining claims, and the level of public use described in the scenario would be expected to result in a negligible effect on the refuge's fish and wildlife populations. The expected harvest levels in this scenario would not be expected to adversely affect subsistence users.

This alternative would reduce the number of hunters in popular areas in this scenario (i.e., the Hulahula River and Atigun Gorge areas), which in turn could reduce the potential for competition between local residents and recreational users for resources compared to the Alternative A scenario. However, with the surface geologic studies and additional public use in other parts of the refuge Chalkyitsik, Venetie, Fort Yukon, and Arctic Village residents still may have concerns that "outsiders" are affecting their subsistence way of life in this alternative.

Availability of Other Lands - As noted in the Section 810(a) evaluation for Alternative A, there may be other lands available for the uses considered, but lands outside of the refuge are not considered because they are beyond the scope of this plan. The Alternative G public use scenario focused on existing and potential popular recreational use areas. There are other areas within the refuge that could provide opportunities for similar use, but they have not been identified by the Service.

The mining assessment work considered in the scenario is site-specific. There are only nine active claims in the Arctic Refuge where assessments are required.

Other Alternatives - Seven management alternatives were developed for the Arctic Refuge plan. Five of the alternatives do not provide for new economic uses in the refuge; two of the alternatives provide for new economic uses. All of the alternatives would permit increased recreational use of the refuge if it is compatible with refuge purposes. Alternative G differs from the other alternatives in that it would limit the increase in public use to maintain the refuge's existing wilderness values.

Findings - Under the Alternative G scenario a limited increase in public use, surface geologic studies, and annual assessments of existing mining claims are projected to occur. All of the potential impacts that would result from the Alternative G scenario would be localized. None of the projected uses in the scenario would adversely affect subsistence fish and wildlife population levels. Sufficient resources would be available to meet subsistence user needs. In this scenario reductions in public use would occur in localized areas, which would help reduce the potential for competition between local residents and recreational users. With a projected increase in public use in other parts of the refuge, however, local residents may have concerns about impacts to their way of life. Both the Service and the State of Alaska would take steps to ensure that opportunities for subsistence harvests are maintained. The Service thus concludes that Alternative G would not result in significant restrictions of subsistence uses on the Arctic Refuge.

Recreation

The Alternative G scenario generally would have the same negligible effect on recreational use as described for Alternative A. The assessments of existing mining claims and surface geologic studies in the scenario would have a negligible effect on recreational use. The projected increase in recreational use is not expected to result in increased competition, perceived crowding, and other recreational user conflicts in most of the refuge.

In three areas, however, the Alternative G scenario would affect recreational use. To maintain existing wilderness values, the Service would reduce the number of projected hunting groups by 48% in the Hulahula drainage (relative to the levels in the Alternative A scenario); in the Atigun Gorge area the number of hunting groups would be reduced by 12%, and the number of hiking groups by 28% (again relative to the levels in the Alternative A scenario). As a result of these restrictions, sport hunters and hikers would not necessarily be able to visit areas they originally planned to visit--72 sport hunters in the Hulahula drainage, and 6 hunters and 42 hikers in the Atigun Gorge area would be required to choose alternate areas. Given the size of the refuge and the relatively small number of recreational users projected to visit the refuge, it is expected that all of the hunters and hikers who are displaced would be able to find other areas within the refuge that would satisfy their needs. For the hikers and hunters that are allowed into the Hulahula drainage and Atigun Gorge, the restrictions in use levels would help minimize competition between user groups, reduce the potential for perceived overcrowding, and help ensure that visitors seeking a high quality wilderness recreational experience would continue to find this opportunity in the refuge.

In the Alternative G scenario aircraft access also would be limited in the Firth River-Mancha Creek area to maintain wilderness experience opportunities. The scenario assumes two airplanes, carrying 4 backpackers, would use the Firth River-Mancha Creek area. This restriction would limit the freedom of these visitors to land aircraft in the area--airplanes could only land at two sites in this area. On the other hand, the restriction would also assure that refuge visitors would be able to find at least one area relatively free of mechanization and other signs of people. Visitors in this area could experience quiet, solitude, independence and challenge in a wilderness setting that can only be found in a few places in the United States today.

Cultural Resources

The Alternative G scenario would have the same effect on cultural resources as described for the Alternative A scenario. Surface geologic studies and the annual assessment work on existing mining claims would not be expected to adversely affect refuge cultural resources. Some damage to sites may occur incidental to subsistence activities and recreational use. The highest potential for damage occurring would be at camping sites because of the possibility that these sites were used in the past. Damage to resources largely would be avoided by completing cultural resource inventories and evaluations, and through the use of mitigation or preservation measures.

Wilderness Designation Effects of Alternative G (50 Years)

In Alternative G the Service would propose all of the non-wilderness lands in the Brooks Range, (about 5.5 million acres or 2.2 million ha) and the Porcupine Plateau (about 4.1 million acres or 1.6 million ha) for wilderness designation. Only the "1002" coastal plain, covering a total of 1.5 million acres (627,000 ha) would not be proposed for wilderness designation.^{a/}

^{a/}The "1002" coastal plain area would be managed as a minimal management area pending congressional action.

Table 10 in Chapter V indicates what uses would be permitted in the wilderness and non-wilderness portions of the refuge. Wilderness designation would provide long-term congressional protection to fish and wildlife habitats found in these areas of the refuge.

Effect on Refuge Management

The special provisions attached to the Alternative G wilderness proposal could affect refuge management. Under the management directions of this alternative no permanent administrative facilities or structures could be built in the refuge, no manipulation of habitats or populations could occur, and mechanized access would be limited in certain areas. These actions would limit the management flexibility of the agency in the future. The Service, however, does not foresee a need to build new administrative cabins, control predator populations, implement a timber management program, or take other actions in the Arctic Refuge that would be legislatively precluded under this alternative. Day-to-day management of the refuge would not be adversely affected by the management directions in this alternative. Existing refuge management programs generally would continue as they have in the past. If a management emergency arose the Service could permit activities it might not otherwise allow under this alternative. Thus, overall Alternative G would have a minor effect on refuge management.

Impacts on Areas Proposed for Wilderness

Effects on Wilderness Values

1. Naturalness - Public use, mining assessment work, and surface geologic studies would be the only permitted activities that could affect naturalness in the proposed wilderness area under the Alternative G scenario. The wilderness proposal in Alternative G, unlike the previous alternatives, would affect recreational use in the refuge--although the same type of users would occur, in this alternative the intensity of use would be reduced relative to Alternative A (see the description of the scenario).

With a 24% reduction in total public use in the Atigun Gorge area, relative to the Alternative A scenario, impacts to perceived naturalness would be reduced. Less litter, and fewer campsites and obvious trails would be expected in this area. The naturalness of a cumulative area totaling less than one acre (0.4 ha) would be diminished.

In the rest of the approximately 9.7 million acres (3.9 million ha) south of the "1002" area and the existing Arctic Wilderness, recreational use is projected to be relatively light: about 73 hikers, 300 floaters, and 155 hunters are projected to use this area. Even areas with good access, such as the Sheenjok River, probably would be visited by no more than 20 groups per year. This level of use would not be expected to result in measurable adverse impacts to naturalness.

The mining assessment work and surface geologic studies would have the same effect as noted for Alternative A on naturalness. Disturbance of the surface vegetative cover and displacement of wildlife caused by the mining assessment work would be very localized, directly affecting a maximum of 10 acres (4 ha) in the refuge. Surface geologic studies results in essentially no surface disturbance, and would not affect any site for more than a couple of hours--disturbance of vegetation and wildlife would be negligible.

2. Outstanding opportunities for solitude - Under the Alternative G wilderness proposal the Service would limit the number of groups in the refuge. The public use scenario states that only 14 hunting groups and 20 hiking groups would be permitted in the Atigun Gorge area. With a 12% reduction in the number of hunting groups in the Atigun Gorge, relative to Alternative A, the chances of seeing another group would decrease during the first week of the sheep hunting season - the peak use period.

In the rest of the refuge, south of the existing Arctic Wilderness and the "1002" area, public use is projected to be relatively light--about 510 recreational users. Public use would be expected to occur primarily in areas with good access, such as the Sheenjek and Porcupine rivers. Most areas probably would be visited by more than 20 groups, spread out over the summer and early fall. It is unlikely, with this low level of use, that a group would see or hear another group in the same area.

Surface geologic studies would occur in the summer south of the "1002" area. Although the geologic studies field crew could visit many sites with its helicopter, the chances of the field crew being seen or heard for more than a few minutes by other refuge visitors would be negligible--the large size of the area (about 9.7 million acres) makes it unlikely that the few recreational users in this area (about 510 recreational users over the year) would encounter the field crew. Furthermore, most recreational use would occur along rivers, while the surface geologic studies would occur over a much larger area that receives little if any use due to the lack of access.

The mineral assessment work would occur on nine claims in the southern portion of the refuge. Only 2 or 3 people would be on each of the mining claims in the refuge for a few weeks in the summer. Five of the claims are near the Wind River, a national wild river, but assessment work on the claims probably would not be evident to most people floating down the river--the claims are off the main river on side tributaries and the topography and vegetative cover would help hide the sites. A small degree of disruption to solitude could occur from noise generated through travel to and from the claims and from the operation of machinery at the claims. Noise from the five claims near the Wind River would affect a total area estimated to cover less than 150 acres (61 ha) for no more than 30 days each year. The other claims are in areas that are not likely to be visited by recreational users. Thus, the chances of refuge visitors seeing the claims or hearing noise from work on the claims would be exceedingly small.

3. Outstanding opportunities for primitive recreation - Under the Alternative G scenario there would be a 24% reduction in total public use of the Atigun Gorge area relative to Alternative A. With restrictions on use levels, the quality of the primitive recreational experience would continue to be maintained--like most of the Arctic Refuge, visitors in the Atigun Gorge area would be able to hunt, hike, view wildlife, etc., in a primitive, natural setting, with few other people.

The geologic studies field crew would visit numerous sites in this scenario, but the crew would occupy each site for a very short period of time (less than a day). Visitors would continue to be able to hunt, fish, hike, etc., in a primitive setting on all of these sites.

On the nine active mining claims in the refuge opportunities for recreation would be eliminated, regardless of the wilderness designation. The assessment work would affect no more than an estimated 10 acres (4 ha). No people, however, would be expected to visit these areas to recreate.

4. Special features - The Arctic Refuge has many special features, including the Wind, Ivishak and Sheenjek wild rivers, Atigun Gorge, the Porcupine caribou herd, the Brooks Range, Porcupine Lake, Old John Lake, the ramparts of the Porcupine River, and the upper Coleen River.

The projected level of public use in this scenario would not be expected to adversely affect the scenic and wildlife features in the Atigun Gorge area--limiting the increase in public use would help ensure the resources in this area are protected. Most other areas with special features probably would be visited by no more than 20 groups per year, which should not result in adverse impacts to the special features. Although the level of sport hunting in the refuge may increase under this alternative, resulting in additional caribou being harvested, the Porcupine caribou herd should sustain this harvest with no adverse effect.

The assessment work on the mining claims would have the same effect on special features as described for the Alternative A scenario. The assessment work would involve the presence of 2 to 3 people, some site clearing, and installation of machinery, for two weeks in the summer. Up to a maximum of 5 acres (2 ha) could be disturbed near the Wind River, the only special feature of the refuge with mining claims. This would have a negligible effect on the physical and biological qualities of the river corridor.

Surface geologic studies could occur on areas that are special features, but this activity would occur for a very short period of time and have a negligible effect on the flora, fauna and geologic qualities of these areas.

Conclusion - Wilderness designation would help maintain the naturalness, solitude, primitive recreation, and special features on about 9.7 million acres (3.9 million ha) in Arctic Refuge. The special management directions under this alternative would help ensure that wilderness values are maintained. The projected level of public use, assessments of mining claims, and surface geologic studies in the area proposed for wilderness in this scenario would have a negligible effect on the area's wilderness qualities, affecting a cumulative area of no more than 11 acres (4 ha).

Effect on the Level of Oil and Gas Activities South of the "1002" Area

Under Section 1003 of the Alaska Lands Act all of the Arctic Refuge is closed to oil and gas leasing. Unless the statute is amended, designating additional wilderness in the refuge would have no effect on oil and gas leasing activities in the Arctic Refuge. Surface geologic studies for scientific purposes could occur in the designated wilderness, but motorized surface equipment generally would not be permitted. The wilderness proposal would specifically preclude core drilling and seismic surveys on about 9.7 million acres (3.9 million ha) or 86% of the non-wilderness refuge lands (unless conducted under the provisions of Section 1010 of the Alaska Lands Act).

Conclusion - The Alternative G wilderness proposal would preclude most oil and gas studies using motorized surface equipment on over approximately 9.7 million acres of the refuge. The proposal would have no effect on oil and gas production as this use already is prohibited under law.

Effect on the Level of Mining Development

There are nine active mining claims within the Arctic Refuge. The Service would take no actions in this alternative that would restrict mining activity--mining assessment work on the existing active claims would continue, regardless of the wilderness designation. Mining of valid claims could occur throughout the refuge under Section 304(c) of the Alaska Lands Act. However, based on the high cost of access into the areas and developing the mines, no development is projected to occur in the scenario.

Conclusion - The Alternative G wilderness proposal would have no effect on the assessment of mining claims within the Arctic Refuge

Effect on the Level of Commercial Timber Harvest Operations

Wilderness designation would preclude commercial timber harvest operations on the south slopes of the Brooks Range and the Porcupine Plateau boreal forest. In particular, wilderness designation would preclude this economic use on approximately 500,000 acres (202,000 ha) of mixed forest and closed needleleaf forest in the Porcupine River drainage--an area which may have some timber of commercial value. As a result, potential benefits to the local economy would be foregone.

Conclusion - The Alternative G wilderness proposal would preclude the possibility of commercial timber harvesting in the only portion of the refuge that may have timber of economic value.

SUMMARY OF THE SECTION 810(a) EVALUATIONS AND FINDINGS

Section 810(a) of the Alaska Lands Act states:

In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes.

The management alternatives in the Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement do not withdraw, reserve, lease or permit any use of the public lands, as defined by Section 102(3) of the Alaska Lands Act, within the refuge. However, they do recommend various land uses be allowed on the refuge. It is for this reason that Section 810 evaluations and findings are included in this document.

The Arctic Refuge Comprehensive Conservation Plan is a general land use plan, and makes only recommendations for land uses on the refuge. Other Service actions on the refuge, including development of the more specific refuge management plans, and issuance of special use permits, will directly affect specific land uses on the refuge. The Service will make additional Section 810 evaluations, as necessary, for other actions that would allow land uses on Arctic Refuge.

As one of the four major purposes of Arctic Refuge, under Section 303(2)(B) of the Alaska Lands Act, subsistence considerations have been addressed throughout the plan. Chapter II of the plan identifies subsistence concerns raised by local residents. Chapter IV notes important subsistence species, describes subsistence use patterns, and identifies areas where local residents harvest resources in the refuge. All of the management alternatives included in this plan share a common management direction on subsistence. All of the alternatives would provide for continued subsistence use of refuge resources. In its Section 810(a) evaluations of the seven alternatives, included in this chapter, the Service determined that none of the alternatives, with the possible exception of Alternative B, would significantly restrict subsistence use. In the case of Alternative B, with oil leasing on the south side of the Brooks Range there could be a minor, long-term impact to the Porcupine caribou herd. This in turn could result in a significant restriction to some subsistence users, specifically Arctic Village and Venetie residents, in the refuge.

The preferred alternative, Alternative A, provides broad directions for uses of the 19,191,000 acres (7,766,000 ha) of federal lands within the refuge boundary. A complete description of the actions recommended in the preferred alternative is found in Chapter V. The primary purpose of the preferred alternative is to protect fish and wildlife populations and habitats, and to maintain opportunities for subsistence activities and other public uses of the refuge. Actions recommended in the alternative for the public lands include maintaining the refuge in an undeveloped state; maintaining traditional access

opportunities; maintaining opportunities for recreational activities, including commercial guiding operations; and permitting oil and gas studies (south of the "1002" area) where compatible with refuge purposes.

The Service determined in its Section 810(a) evaluation of the preferred alternative that opportunities for subsistence would be maintained in the Arctic Refuge. All of the potential impacts that would result from Alternative A would be localized. Some negligible to minor localized impacts to subsistence fish and wildlife population levels could occur from economic uses (e.g., mining of valid claims), but this would not significantly affect subsistence activities.

Increased numbers of sport hunters in this alternative would harvest more big game in the refuge than in 1987, but sufficient game should be available for local residents to satisfy their needs. The Service would work with the Native corporations, the Alaska Department of Fish and Game, and the state Boards of Fisheries and Game to ensure that opportunities for subsistence activities are maintained.

The Service developed and evaluated six other management alternatives for Arctic Refuge. Table 19 at the end of Chapter V summarizes the differences between the alternatives. The primary differences in the alternatives are the permitted commercial uses and the size of the areas proposed for wilderness designation. Alternative B would provide opportunities for several additional economic uses--oil and gas leasing (with congressional approval) and commercial timber harvesting. Alternative C is similar to Alternative B, the major difference being oil and gas leasing would not be permitted in Alternative C. Alternatives D, E and F all propose portions of the refuge be designated as wilderness, the only difference between the alternatives being the size of the wilderness proposal. Alternative G proposes all of the federal lands for wilderness designation (except for the "1002" coastal plain area), and adds an additional layer of protection to ensure that the refuge's wilderness qualities are maintained.

MITIGATION

Adverse impacts resulting from implementing the Arctic Refuge Comprehensive Conservation Plan will be mitigated whenever and wherever possible, relative to the goals and objectives of the plan. As noted in the common management directions, the Alaska Department of Fish and Game will regulate fish and wildlife harvests in the refuge. Changes in the hunting and fishing regulations and improved inventory procedures should mitigate most adverse effects associated with increased numbers of hunters and anglers visiting the refuge. The Service will promulgate regulations, develop stipulations, and issue permits to mitigate other impacts. These regulations, stipulations and permits will mitigate impacts by: avoiding the impact altogether; minimizing the impact by limiting the degree or magnitude of the action; rehabilitating or restoring the affected environment; or compensating for the impact by replacing or providing substitute resources or environments. Mitigation may consist of standard stipulations imposed on common refuge activities, or may be attached to special use permits. Site-specific, project-specific mitigation identified through detailed "step-down" management plans or the National Environmental Policy Act process also would entail stipulations

attached to permits. The degree, type, and extent of mitigation undertaken will depend on site-specific conditions at the time of the impact and the management goals and objectives of the actions being implemented. Wilderness designation in Alternatives D through G would preclude the need for mitigation of most potential commercial uses.

If recreational use in the refuge increases as projected in the scenarios, the Service may have to mitigate potential adverse impacts in localized areas (e.g., the Hulahula drainage, Atigun Gorge area) to protect refuge resources. Steps that may be required include dispensing information, issuing back country permits, instituting eligibility requirements, limiting use, or restricting activities. If it becomes necessary to restrict or limit use, subsistence users would be given preference as noted under the "subsistence use common management direction."

SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

In all of the alternatives, including the Service's preferred alternative, the primary short-term use of the refuge would be for fish and wildlife conservation, subsistence and recreational purposes. Projected increases in the number of people visiting and using the refuge over the planning period in the alternatives would have a negligible to minor, localized effect on the long-term productivity of the refuge's fish and wildlife populations--some animals may be displaced in localized areas with increasing numbers of people, but this would not affect the refuge's overall long-term productivity. None of the economic uses permitted in these five alternatives, except for hardrock mining and oil and gas production, would affect the long-term biological productivity of the refuge (although some animals temporarily may be displaced to other areas). Mining of valid claims could occur in the alternatives, which would affect the long-term biological productivity of the project site(s) but not the refuge's overall productivity.

Alternative B would have the potential to affect the long-term productivity of refuge resources. Specifically, oil leasing permitted under this alternative could result in minor, long-term impacts to the Porcupine caribou herd. Development of exploratory drilling pads, a production pad, and related production facilities (e.g., pipelines, roads, reserve pits), together with potential developments on private lands outside of and within the refuge, would result in cumulative impacts that would reduce the long-term productivity of the herd. Some long-term loss would be expected even if oil and gas activities are properly conducted in accordance with the regulations and environmental stipulations assumed in the scenario.

In Alternatives D, E, F, and G wilderness designation would provide long-term protection to refuge habitats, and would thus help maintain long-term productivity of the refuge's populations. Most existing uses of the refuge (e.g., hunting, trapping, hiking) would not be affected by the designation. No new permanent structures (except for administrative purposes) would be permitted in the wilderness addition, however, and wildlife habitat manipulation and fisheries development activities would be limited. Several potential short-term uses also would be precluded, including most commercial uses (e.g., commercial timber harvesting). Precluding these economic uses would limit the potential for increases in the long-term productivity of the local economy.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Most of the uses permitted under the management alternatives would not constitute irreversible and irretrievable commitments of resources. Management actions within the alternatives can be changed if the need arises by changing the plan.

Four possible irreversible and irretrievable commitments of resources could occur in the alternatives. The commitment of staff time and dollars in all of the alternatives is an irreversible and irretrievable commitment that cannot be avoided. In all of the alternatives the Service would be required to permit mining of claims determined to be valid in the refuge. If mining were to occur, the removal of the minerals would constitute an irretrievable commitment of natural resources. Increased noise, the presence of people and facilities, and alteration of the landscape would affect the wilderness qualities of the refuge. Although the landscape may be reclaimed following production, it would never be exactly the same as it is currently.

In all of the alternatives there could be an irreversible and irretrievable loss of cultural resources. Mining could result in the excavation or unknowing destruction of cultural resources in all of the alternatives. The projected increase in public use in all of the alternatives also could result in the loss of cultural resources from site degradation, vandalism, and unauthorized artifact collection. This potential loss of prehistoric features would be minimized or eliminated through the Service's continuing efforts to survey, identify and protect cultural resources in the refuge.

In Alternative B there could be several irreversible and irretrievable commitments due to oil and gas activities. The removal of petroleum, should development occur, would constitute an irretrievable commitment of natural resources. Oil development could result in irretrievable losses of cultural resources similar to those noted above for mining. Although oil development would result in a long-term impact to the Porcupine caribou herd, the impact would not be an irreversible loss--after oil activities cease, and assuming environmental stipulations are followed, the Porcupine caribou herd could again use this area. Increased noise, the presence of people, machinery and facilities, and alteration of the landscape would affect the wilderness qualities of the production site and surrounding areas. Although the landscape would be reclaimed after the petroleum has been removed, it probably would never be exactly the same as it is currently.

Wilderness designation in Alternatives D, E, F, and G would result in no irreversible and irretrievable commitments of resources. Congress establishes these conservation units, and can revoke the designation as well.

VII. EVALUATION OF THE ALTERNATIVES

VII. EVALUATION OF THE ALTERNATIVES

Selecting a preferred management alternative involves determining how well each alternative satisfies criteria or standards set forth by the decisionmaker. This section evaluates each of the seven alternatives for Arctic Refuge against two evaluation criteria, and proposes one of the alternatives as the plan for managing the refuge.

EVALUATION CRITERIA

To select the preferred alternative, and minimize subjectivity, the seven alternatives were judged primarily against two criteria. These criteria, in order of importance, were:

- 1) To what extent does the alternative satisfy the purposes of the refuge and other provisions of the Alaska Lands Act?
- 2) To what extent does the alternative satisfy the issues and concerns of the public?

The relative costs of implementing the alternatives also were examined in the evaluation of the alternatives.

The most important criterion in evaluating the alternatives is the degree to which the alternative achieves the four purposes of the refuge, as mandated by the Alaska Lands Act (see Chapter I). The biological and socioeconomic assessments indicate how well each alternative satisfies this criterion. Table 23 summarizes the potential biological impacts of each alternative, and Table 24 summarizes the socioeconomic impacts. Table 25 summarizes the effects of the alternative wilderness proposals on wilderness values and other significant wilderness issues identified in Chapter III.

None of the alternatives is expected to result in major impacts to refuge resources overall--most of the uses permitted under the alternatives would result in negligible impacts from a refuge-wide perspective. All of the alternatives project increased public use, but the level of use would be expected to have a negligible impact on refuge resources. In all of the alternatives if mining of valid claims occurs there could be major localized impacts to fish, water quality and quantity, and vegetation; the ecosystems in this area could be significantly altered. Oil development and commercial timber harvesting in Alternative B have the potential to result in localized reductions in populations and habitats. In particular, oil development on the south side of the Brooks Range (if permitted by Congress) could result in minor impacts to the Porcupine caribou herd. The productivity of the herd could be adversely affected by the cumulative effects of this development and other developments within the refuge and on adjacent lands. Oil development also could result in major localized impacts to vegetation, and water quality and quantity, moderate impacts to fish and raptors, and minor impacts to bears and moose. Commercial timber harvesting along the Porcupine River in both Alternatives B and C could result in minor, localized impacts to vegetation, water quality, and ecosystems in the project site, and moderate impacts to raptors.

Table 23. Summary of the biological impacts resulting from the seven management alternatives for Arctic Refuge.

Resource	Alternative A (Current Situation)	Alternative B	Alternative C
Vegetation	Negligible impact	Minor adverse impact overall; major long-term adverse impacts from oil development and mining and minor adverse impacts from timber harvesting in localized areas	Negligible impact overall; major long-term adverse impacts from mining and minor adverse impacts from timber harvesting in localized areas
Fish	Negligible impact	Minor adverse impact overall; major adverse impacts in localized areas due to mining and oil development	Negligible impact overall; major adverse impacts in localized areas if mining occurs
Waterfowl	Negligible impact	Negligible impact refugewide; small numbers of waterfowl impacted by oil development	Negligible impact
Shorebirds	Negligible impact	Negligible impact	Negligible impact
Raptors	Minor adverse impact with increase in public use	Minor adverse impact on refuge populations; moderate long-term adverse impacts in localized areas from oil development and timber harvesting	Minor adverse impact on refuge populations; moderate long-term adverse impacts in localized areas from timber harvesting
Marine Mammals	Negligible impact	Negligible impact	Negligible impact
Caribou	Negligible impact	Minor adverse impact overall; moderate long-term adverse impact from oil development on caribou wintering in the project site; potential for cumulative impacts adversely affecting the Porcupine caribou herd's productivity	Negligible impact
Moose	Negligible impact	Negligible impact overall; minor adverse impact in localized areas from oil development	Negligible impact
Dall Sheep	Negligible impact	Negligible impact	Negligible impact
Muskox	Negligible impact	Negligible impact	Negligible impact
Brown and Black Bear	Negligible impact	Negligible impact overall; minor adverse impacts in localized areas from oil development	Negligible impact
Furbearers	Negligible impact	Negligible impact	Negligible impact
Threatened and Endangered Species	No effect on most species; minor to negligible adverse impacts to peregrine falcons from recreational use	No effect on most species; potential for a moderate long-term adverse impact to the endangered American peregrine falcon from oil development	No effect on most species; minor to negligible adverse impacts to peregrine falcons from recreational use
Water Quantity and Quality	Negligible impact	Negligible impact overall; minor to major, long-term adverse impacts in localized areas from mining and oil development	Negligible impact overall; major long-term adverse impacts in localized areas if mining occurs
Air Quality	Negligible impact	Negligible impact overall; minor adverse impacts in localized areas from oil development	Negligible impact
Ecosystems	Negligible impact	Minor adverse impact overall; moderate adverse impacts in localized areas due to oil development and mining; timber harvesting would have some minor adverse impacts in the project area	Negligible impact overall; moderate adverse impacts in localized areas due to mining; timber harvesting would have some minor adverse impacts in the project area

Alternative D	Alternative E	Alternative F	Alternative G
Negligible impact overall; major, long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; major, long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; major, long-term adverse impacts in localized areas if mining occurs	Negligible impact overall
Negligible impact overall; major long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; major long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; major long-term adverse impacts in localized areas if mining occurs	Negligible impact overall
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Minor adverse impact with increase in public use	Minor adverse impact with increase in public use	Minor adverse impact with increase in public use	Minor adverse impact with increase in public use
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact	Negligible impact	Negligible impact	Negligible impact
No effect on most species; minor to negligible adverse impacts to peregrine falcons from recreational use	No effect on most species; minor to negligible adverse impacts to peregrine falcons from recreational use	No effect on most species; minor to negligible adverse impacts to peregrine falcons from recreational use	No effect on most species; minor to negligible adverse impacts to peregrine falcons from recreational use
Negligible impact overall; major long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; major long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; minor to major, long-term adverse impacts in localized areas if mining occurs	Negligible impact overall; minor adverse impacts to water quality possible if public use increases
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible impact overall; mining would have a moderate adverse impact on ecosystems in a localized area	Negligible impact overall; mining would have a moderate adverse impact on ecosystems in a localized area	Negligible impact overall; mining would have a moderate adverse impact on ecosystems in a localized area	Negligible impact overall

Table 24. Summary of the socioeconomic impacts resulting from the seven management alternatives for Arctic Refuge.

Resource/Activity	Alternative A (Current Situation)	Alternative B	Alternative C
Population	Negligible impact	Negligible impact overall; moderate short-term population increase possible in Fort Yukon from oil development	Negligible impact
Economy	Negligible benefits for the local economy	Moderate benefits to the local economy, primarily to Fort Yukon from oil development; some benefits to the local, state and federal governments from leasing revenues and royalties; negligible benefits to the local economy from the commercial harvesting and mining operations	Negligible benefits to the local economy from commercial timber harvesting and mining operations
Subsistence	Negligible impact; no significant restriction of subsistence activities	Negligible impact refuge-wide; potential for significant restrictions to some local residents if oil development reduces opportunities to harvest caribou; increased concerns of local residents about maintaining their subsistence way of life	Negligible impact; no significant restriction of subsistence activities
Recreation	Negligible impact overall; minor impact could occur due to perceived crowding and competition for resources in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages)	Minor impact overall; minor impact could occur due to perceived crowding and competition for resources in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages); oil development would reduce or eliminate opportunities for recreation in a localized area, and increase for a short time the level of recreational use in the refuge	Negligible impact overall; minor impact could occur as a result of perceived crowding and competition for resources in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages)
Cultural Resources	Negligible effect provided cultural resource inventories are completed and mitigation measures are applied	Negligible impact from economic and public uses provided resource inventories are done and mitigation measures are applied	Negligible impact from economic and public uses provided resource inventories are done and mitigation measures are applied

Alternative D	Alternative E	Alternative F	Alternative G
Negligible impact	Negligible impact	Negligible impact	Negligible impact
Negligible benefits for the local economy			
Negligible impact; no significant restriction of subsistence activities	Negligible impact; no significant restriction of subsistence activities	Negligible impact; no significant restriction of subsistence activities	Negligible impact; no significant restriction of subsistence activities
Negligible impact overall; minor impact could occur due to perceived crowding and competition for resources in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages)	Negligible impact overall; minor impact could occur due to perceived crowding and competition for resources in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages)	Negligible impact overall; minor impact could occur due to perceived crowding and competition for resources in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages)	Negligible impact overall; perceived crowding and competition in localized areas (e.g., Atigun Gorge, Hulahula and Kongakut drainages) would decline with reduced use levels; displacement of recreational users from these areas
Negligible effect provided cultural resource inventories are completed and mitigation measures are applied	Negligible effect provided cultural resource inventories are completed and mitigation measures are applied	Negligible impact from economic and public uses provided resource inventories are done and mitigation measures are applied	Negligible impact from economic and public uses provided resource inventories are done and mitigation measures are applied

Table 25. Summary of the effects of the alternative wilderness proposals on the significant wilderness issues for Arctic Refuge.

Effect of Wilderness Designation on:	Alternative A (no wilderness proposed)	Alternative B (no wilderness proposed)	Alternative C (no wilderness proposed)
o Wilderness Values	Assessment work on existing mining claims would impact naturalness and primitive recreation (less than 10 acres); in the Atigun Gorge area increased public use would diminish naturalness and the quality of the recreational experience in a cumulative area totaling less than 1 acre along the river; wilderness values would be maintained in over 99% of the refuge	A placer mine would eliminate naturalness, solitude, and primitive recreation in a 100 acre area, and reduce solitude and the quality of the recreational experience in up to 5,800 acres surrounding it; the commercial timber harvesting operation would impact naturalness in about a 200 acre area along the Porcupine River; an oil development would impact naturalness, solitude and primitive recreation in about 2,000 acres, while the pipeline and service road would impact naturalness and solitude totaling less than 13,000 acres; the increase in public use would impact naturalness, solitude and the quality of the recreational experience in a cumulative area totaling less than 1 acre in the Atigun Gorge; wilderness values maintained in over 95% of the refuge	A placer mine would eliminate naturalness, solitude, and primitive recreation in a 100 acre area, and reduce solitude and the quality of the recreational experience in up to 5,800 acres surrounding it; the commercial timber operation would impact naturalness in about a 200 acre area along the Porcupine River; the increase in public use would impact naturalness, solitude and the quality of the recreational experience in a cumulative area totaling less than 1 acre in the Atigun Gorge; wilderness values would be maintained in over 99% of the refuge
o Oil and Gas Activities South of the "1002" Area	No effect; only geologic mapping, and oil and gas studies (including seismic surveys and core drilling) could be permitted (no motorized surface studies projected); no oil and gas leasing permitted (assuming the Alaska Lands Act is not amended)	No effect; geologic mapping, oil and gas studies (including seismic surveys and core drilling) could be permitted (projected to affect 4,900 acres), and oil and gas production could be permitted, with congressional approval (one development projected on a 500 acre site, plus a 10 mile long pipeline within the refuge)	No effect; only geologic mapping and oil and gas studies (including seismic surveys and core drilling) could be permitted (no motorized surface studies projected); no oil and gas leasing permitted (assuming the Alaska Lands Act is not amended)
o Mining Development	No effect; required assessment work on active claims would continue (affecting less than 10 acres); mining of valid claims would be permitted throughout the refuge (no mines projected)	No effect; required assessment work on active claims would continue; mining of valid claims would be permitted throughout the refuge (one placer mine projected on a 100 acre site)	No effect; required assessment work on active claims would continue; mining of valid claims would be permitted throughout the refuge (one placer mine projected on a 100 acre site)
o Commercial Timber Harvesting	No effect; this use would be precluded as all of the refuge lands would be designated wilderness, minimal management, or wild river management areas	No effect; this use could be permitted in the intensive and moderate management areas if compatible with refuge purposes (one 20-acre operation projected along the Porcupine River)	No effect; this use could be permitted in the moderate management areas if compatible with refuge purposes (one 20-acre operation projected along the Porcupine River)

Alternative D (46% of the non-wilderness refuge lands proposed for wilderness)	Alternative E (72% of the non-wilderness refuge lands proposed for wilderness)	Alternative F (79% of the non-wilderness refuge lands proposed for wilderness)	Alternative G (86% of the non-wilderness refuge lands proposed for wilderness)
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A placer mine would eliminate naturalness, solitude and primitive recreation on a 500 acre site, and reduce solitude and the quality of the recreational experience in up to 5,800 acres surrounding it; the increase in public use would impact naturalness, solitude, and the quality of the recreational experience in a cumulative area totaling less than 1 acre in the Atigun Gorge; the wilderness proposal would help maintain wilderness values in about 5.2 million acres	A placer mine would eliminate naturalness, solitude, and primitive recreation on a 500 acre site, and reduce solitude and the quality of the recreational experience in up to 5,800 acres surrounding it; the increase in public use would impact naturalness, solitude, and the quality of the recreational experience in a cumulative area totaling less than 1 acre in the Atigun Gorge; the wilderness proposal would help maintain wilderness values in about 8.1 million acres	A placer mine would eliminate naturalness, solitude, and primitive recreation on a 500 acre site, and reduce solitude and the quality of the recreational experience in up to 5,800 acres surrounding it; the increase in public use would impact naturalness, and the quality of the recreational experience in a cumulative area totaling less than 1 acre in the Atigun Gorge; the wilderness proposal would help maintain wilderness values in about 8.9 million acres	Assessment work on active mining claims would impact naturalness and primitive recreation (less than 10 acres); in the Atigun Gorge naturalness would be affected in a cumulative area totaling less than 1 acre; the wilderness proposal would maintain the wilderness values in about 9.7 million acres
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Geologic mapping and limited oil and gas studies could be permitted; seismic surveys and core drilling generally would be precluded on 5.2 million acres; no oil and gas leasing would be permitted (assuming the Alaska Lands Act is not amended)	Only geologic mapping and limited oil and gas studies could be permitted; seismic surveys and core drilling generally would be precluded on 8.1 million acres; no oil and gas leasing would be permitted (assuming the Alaska Lands Act is not amended)	Only geologic mapping and limited oil and gas studies could be permitted; seismic surveying and core drilling generally would be precluded on 8.9 million acres; no oil and gas leasing would be permitted (assuming the Alaska Lands Act is not amended)	Only studies for scientific purposes could be permitted; seismic surveying and core drilling generally would be precluded on 9.7 million acres; no oil and gas leasing would be permitted (assuming Section 1003 of the Alaska Lands Act is not amended)
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No effect; required assessment work on active claims would continue; mining of valid claims would be permitted throughout the refuge (no mines projected in the proposed wilderness area)	Required assessment work on active claims would continue; mining of valid claims would be permitted (1 placer mine projected on a 100 acre site) but the mining operations may have higher costs and less flexibility than in other areas	Required assessment work on active claims would continue; mining of valid claims would be permitted (1 placer mine projected on a 100 acre site) but the mining operations may have higher costs and less flexibility than in other areas	Required assessment work on active claims would continue; mining of valid claims would be permitted (no mines projected in the proposed wilderness area)
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No effect; this use would be precluded as all refuge lands would be designated wilderness, minimal management or wild river management areas (no timber harvesting projected in the proposed wilderness area)	This use would be prohibited on the Porcupine Plateau, precluding the possibility of a commercial timber harvest on the Porcupine River; some potential economic benefits consequently would be foregone	This use would be prohibited in all of the Porcupine Plateau, precluding the possibility of a commercial timber harvest in the Porcupine River drainage; some potential economic benefits consequently would be foregone	This use would be prohibited in all of the Porcupine Plateau, precluding the possibility of a commercial timber harvest in the Porcupine River drainage; some potential economic benefits consequently would be foregone
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Most of the alternatives also would have negligible to minor socioeconomic impacts on local residents and refuge users. Negligible impacts are expected to cultural resources in all of the alternatives, provided cultural resource inventories and adequate mitigation measures are undertaken. Population, the local economy, and subsistence generally would experience only negligible effects with the projected increase in refuge recreational use and permitted economic uses. In Alternative B, however, the construction of an oil development south of the "1002" area would have a moderate, short-term impact on the population and provide benefits to the local economy, primarily to Fort Yukon. Oil development also has the potential to significantly restrict the activities of some Arctic Village and Venetie subsistence users, particularly if the development affects the Porcupine caribou herd.

In all of the alternatives more recreational users are expected to visit the refuge. From a refuge-wide perspective, the level of use is expected to result in negligible impacts to refuge users. In Alternatives A through F the recreational experience of some users may be adversely affected in localized areas, such as the Hulahula and Kongakut drainages and the Atigun Gorge area, where perceived crowding and increased competition for refuge resources may occur; this potential impact would not occur in Alternative G, because the level of use would be regulated to maintain existing wilderness values.

Four of the alternatives (D, E, F, and G) would propose wilderness designation for between 46% and 86% of the refuge lands outside of the existing Arctic Wilderness. This action would help ensure that the purposes of the refuge are met and wilderness values are maintained. Wilderness designation would provide long-term congressional protection to refuge fish and wildlife resources. The wilderness proposals would not adversely affect most refuge users. Mining of valid claims could occur in the proposed areas, although with more stringent monitoring and "reasonable" access regulations operators may pay higher costs and have less flexibility in their activities. The proposals would restrict the areas where seismic surveys and core drilling could occur, but would have no effect on oil and gas leasing--all of the Arctic Refuge is closed to this use until Congress specifies otherwise. The wilderness proposals in Alternatives E, F and G would preclude commercial timber harvesting on some or all of the Porcupine Plateau; potential benefits to the local economy consequently would be foregone.

Table 26 summarizes how well each alternative would satisfy the purposes of the refuge. From a refuge-wide perspective, most of the impacts that would result from the seven alternatives would be negligible to minor in extent. With the possible exception of Alternatives B and C, all of the alternatives would conserve the refuge's fish and wildlife populations in their natural diversity; Alternatives B and C could impact refuge populations on a localized basis.^{a/} None of the alternatives is expected to result in a population decrease that would affect the long-term viability of the refuge's fish and wildlife populations. None of the alternatives would prevent the United States from fulfilling its international treaty obligations. With the possible exception of Alternative B, none of the alternatives are expected to significantly affect the availability of important subsistence fish and

^{a/} If mining of valid claims occurs, there could be additional localized impacts in all of the alternatives.

wildlife populations or restrict harvest opportunities; Alternative B could significantly restrict the subsistence harvests of a few local residents in a localized area. All of the alternatives would maintain overall refuge water quality and quantity, although Alternative B could adversely affect water quality and quantity on a localized basis.

The second criterion is the degree to which the alternatives respond to or satisfy the issues and concerns raised by the state, local residents, industry, conservation groups, and other interested parties. The Service must work closely with all of these groups, minimizing conflicts, if it is to effectively manage the refuge and its resources. It must be stressed that this criterion is not the number of people who expressed support for a given alternative during the planning process.

Table 26 evaluates how each alternative addresses the significant issues and concerns raised during the planning process. The major refuge issues and concerns were identified early on in the planning process and provided the basis for the development of the management alternatives. Many groups have an interest in and would be affected by how the Service manages Arctic Refuge. Because of the number of different issues and the diversity of groups affected by management of the refuge, no single alternative probably would satisfy all of the concerns of these groups--each of the alternatives would satisfy the concerns of some groups and cause problems for other groups. For example, Alternative G would satisfy the desire of conservation groups to maximize protection of wilderness values, the Porcupine caribou herd and other refuge resources, but the alternative would not satisfy groups who want to keep open the option of economic development of the refuge. Alternatives B and C would provide for commercial uses that would satisfy these groups, but local residents may oppose Alternative B if it would adversely affect subsistence harvests in the refuge. The Service believes that Alternative A would address most of the major concerns of local residents, refuge users, and other affected groups regarding protection of the refuge's resource values. The alternative would keep open options for management of the non-wilderness portion of the refuge in the future, which would address the concerns of other affected groups.

RELATIVE COSTS OF THE ALTERNATIVES

Staffing needs and management costs are another factor to consider in evaluating the alternatives. Table 28 compares just the annual operations and maintenance costs of the alternatives in graphic form; Table 29 compares the estimated annual operations and maintenance costs of the seven alternatives.^{a/} Alternative B would be the most expensive because of the need to adequately monitor and manage oil exploration and development, and other economic uses of the refuge. Alternative G would be the least costly of the seven alternatives to implement. Alternative A, the preferred alternative, would require 10 more permanent staff than the current (1987) staff and about an 80% increase in funding over the current operations and maintenance budget to fully implement the common management directions outlined in the plan and manage the expected increase in public use.

^{a/}The estimates do not include the cost of managing the "1002" area if oil development occurs.

Table 26. Evaluation of alternatives based on refuge purposes.

Refuge Purposes	Alternative A (Current Situation)	Alternative B	Alternative C
(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd..., polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;	High potential for maintaining natural diversity and abundance of wildlife, while continuing to provide for current levels of traditional uses and access	Natural diversity and abundance of fish and wildlife maintained overall; potential for localized reductions in populations and habitats if developments are permitted (e.g., oil development, timber harvesting)	Natural diversity and abundance of fish and wildlife maintained overall; potential for localized reductions in populations and habitats if developments are permitted (e.g., timber harvesting)
(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;	High potential to protect sensitive fish and wildlife habitats in compliance with international treaties	Protects most sensitive fish and wildlife habitats in compliance with international treaties	Protects most sensitive fish and wildlife habitats in compliance with international treaties
(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii) the opportunity for continued subsistence use by local residents	Good opportunity to provide for continued subsistence use of refuge resources; no significant restrictions of subsistence use by local residents	Maintains opportunities generally for continued subsistence use of refuge resources; potential for significant restrictions of the subsistence uses of a few residents in a localized area	Maintains opportunities generally for continued subsistence use of refuge resources; no significant restrictions of subsistence use by local residents
(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.	High potential to maintain water quality and quantity	Maintains overall water quality and quantity; permitted developments could adversely affect water quality and quantity on a localized basis	Maintains overall water quality and quantity; permitted developments could adversely affect water quality on a localized basis

Alternative D	Alternative E	Alternative F	Alternative G
High potential to maintain natural diversity and abundance of fish and wildlife, while continuing to provide for current levels of traditional use and access	High potential to maintain natural diversity and abundance of fish and wildlife, while continuing to provide for current levels of traditional use and access	High potential to maintain natural diversity and abundance of fish and wildlife, while continuing to provide for current levels of traditional use and access	High potential to maintain natural diversity and abundance of fish and wildlife, while continuing to provide for traditional uses
High potential to protect sensitive fish and wildlife habitats in compliance with international treaties	High potential to protect sensitive fish and wildlife habitats in compliance with international treaties	High potential to protect sensitive fish and wildlife habitats in compliance with international treaties	High potential to protect sensitive fish and wildlife habitats in compliance with international treaties
Good opportunity to provide for continued subsistence use of refuge resources; no significant restriction of subsistence use by local residents	Good opportunity to provide for continued subsistence use of refuge resources; no significant restriction of subsistence use by local residents	Good opportunity to provide for continued subsistence use of refuge resources; no significant restriction of subsistence use by local residents	Good opportunity to provide for continued subsistence use of refuge resources; no significant restriction of subsistence use by local residents
High potential to maintain water quality and quantity	High potential to maintain water quality and quantity	High potential to maintain water quality and quantity	High potential to maintain water quality and quantity

Table 27. Evaluation of alternatives based on significant issues.

Issue/Concern	Alternative A (Current Situation)	Alternative B	Alternative C
Protecting the Porcupine caribou herd	Maintains the caribou population; negligible impacts from public and economic uses	Potential for minor impacts from oil development; cumulative impacts from this use and other human activities within and outside of the refuge could lower the herd's productivity	Maintains the caribou population; negligible impacts from public and economic uses
Protecting wilderness values	Maintains wilderness values overall; in localized areas increasing public use could diminish wilderness values	Wilderness values generally maintained; in localized areas wilderness values would be diminished or lost due to increasing public use, oil development, timber harvesting and other economic uses	Wilderness values generally maintained; in localized areas wilderness values would be diminished or lost due to increasing public use, timber harvesting and other economic uses
Designating additional wilderness	No additional areas proposed for wilderness designation	No additional areas proposed for wilderness designation	No additional areas proposed for wilderness designation
Providing for aircraft and other motorized access into the refuge	Maintains existing opportunities for traditional access (aircraft, snowmachines, motorboats)	Maintains existing opportunities for traditional access (aircraft, snowmachines, motorboats)	Maintains existing opportunities for traditional access (aircraft, snowmachines, motorboats)
Providing for recreational use, including commercial guiding and outfitting	Opportunities maintained for hunting, fishing, and non-consumptive uses; no restrictions placed on increased public use, provided it is compatible with refuge purposes	Opportunities maintained for hunting, fishing, and non-consumptive uses; no restrictions placed on increased public use, provided it is compatible with refuge purposes	Opportunities maintained for hunting, fishing, and non-consumptive uses; no restrictions placed on increased public use, provided it is compatible with refuge purposes
Providing for oil and gas activities south of the "1002" area	Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; no oil and gas development permitted	Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; oil and gas development may be permitted (with congressional approval) on the south side of the Brooks Range	Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; no oil and gas development permitted
Providing for mining on refuge lands	Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values	Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values	Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values
Providing for commercial timber harvesting	No opportunities provided	Commercial timber harvesting may be permitted in 26% of the refuge	Commercial timber harvesting may be permitted in 26% of the refuge

Alternative D	Alternative E	Alternative F	Alternative G
Maintains the caribou population; negligible impacts from public and economic uses	Maintains the caribou population; negligible impacts from public and economic uses	Maintains the caribou population; negligible impacts from public and economic uses	Maintains the caribou population; negligible impacts from public and economic uses
Maintains wilderness values overall; in localized areas increasing public use could diminish wilderness values	Maintains wilderness values overall; in localized areas increasing public use could diminish wilderness values	Maintains wilderness values overall; in localized areas increasing public use could diminish wilderness values	Stringent maintenance of wilderness values in the refuge through regulation
About 5,207,000 acres (46% of the non-wilderness refuge lands) proposed for wilderness designation	About 9,100,000 acres (72% of the non-wilderness refuge lands) proposed for wilderness designation	About 8,900,000 acres (79% of the non-wilderness refuge lands) proposed for wilderness designation	About 9,641,000 acres (86% of the non-wilderness refuge lands) proposed for wilderness designation
Maintains existing opportunities for traditional access (aircraft, snowmachines, motorboats)	Maintains existing opportunities for traditional access (aircraft, snowmachines, motorboats)	Maintains existing opportunities for traditional access (aircraft, snowmachines, motorboats)	Maintains most opportunities for existing access; use of motorboats prohibited on mountain lakes, and use of jet boats prohibited on all refuge waters; aircraft access limited in the Mancha Creek-Firth River area
Opportunities maintained for hunting, fishing, and non-consumptive uses; no restrictions placed on increased public use, provided it is compatible with refuge purposes	Opportunities maintained for hunting, fishing, and non-consumptive uses; no restrictions placed on increased public use, provided it is compatible with refuge purposes	Opportunities maintained for hunting, fishing, and non-consumptive uses; no restrictions placed on increased public use, provided it is compatible with refuge purposes	Opportunities generally maintained for hunting, fishing, and nonconsumptive uses; restrictions would be placed use levels, if carrying capacity limits are exceeded, to protect existing wilderness values
Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; no oil and gas development permitted	Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; no oil and gas development permitted	Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; no oil and gas development permitted	Oil and gas studies permitted with restrictions in the Arctic Wilderness and wild river corridors; no oil and gas development permitted
Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values	Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values	Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values	Allowed only on valid claims; reasonable restrictions may be placed on operations to limit impacts to refuge resource values
No opportunities provided	No opportunities provided	No opportunities provided	No opportunities provided

Table 28. Relative cost of implementing the seven alternatives.

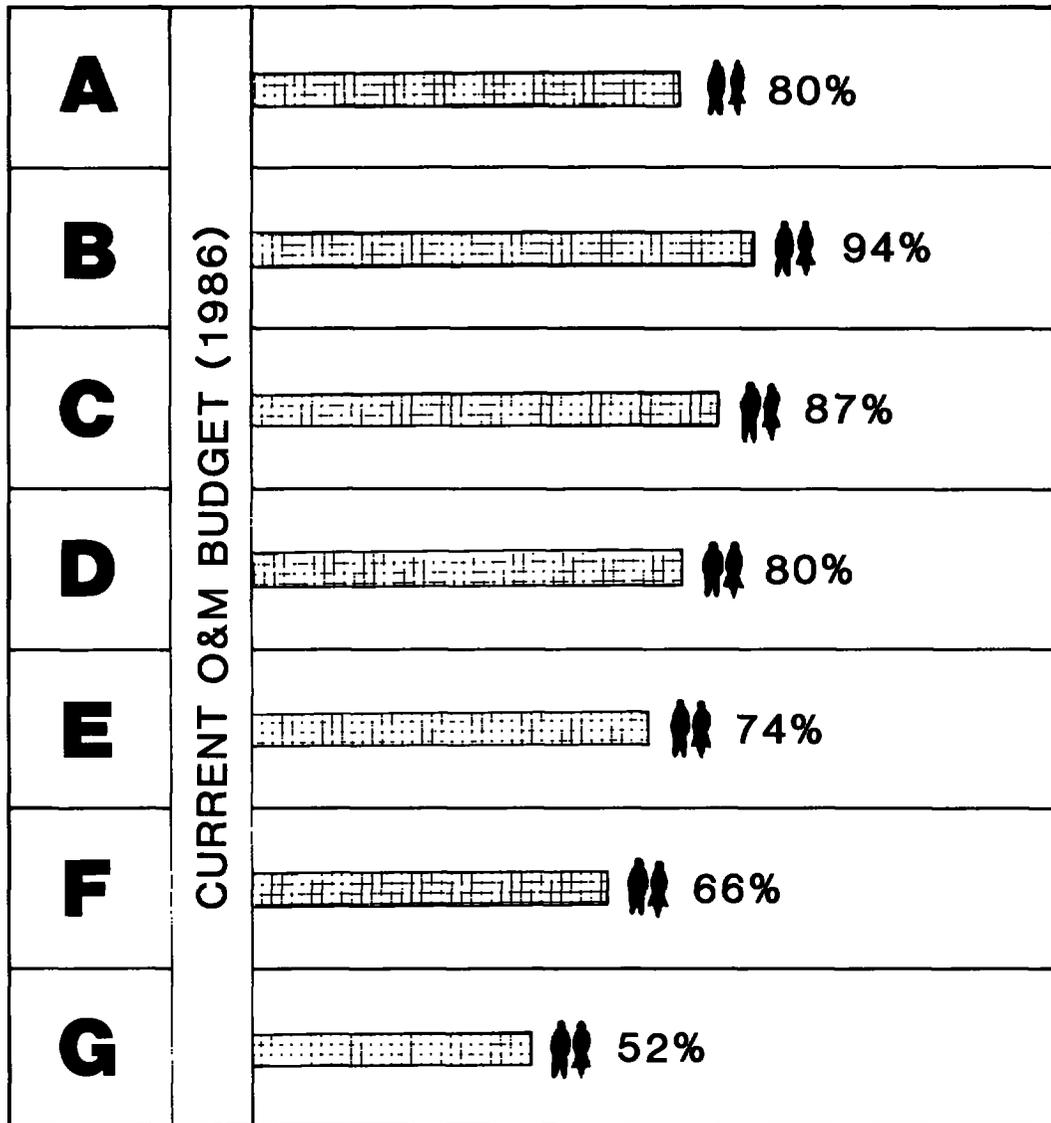


Table 29. Estimated staffing levels and costs (in 1,000's of dollars) of the seven alternatives.

	<u>Alternatives</u>						
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
<u>Refuge Staffing</u>	26	28	27	26	25	24	22
<u>Refuge Annual Budget</u>							
o Salaries	1,153	1,240	1,197	1,153	1,110	1,060	973
o Operational & Administrative Overhead	298	320	309	298	286	274	251
o Fish & Wildlife Programs	428	460	444	428	412	393	361
o Interpretation & Environmental Education	74	30	77	74	72	68	63
o Equipment Maintenance	65	70	68	65	63	60	55
o Facilities Maintenance	65	70	67	65	63	60	55
<u>Total \$</u>	<u>2,083</u>	<u>2,240</u>	<u>2,162</u>	<u>2,083</u>	<u>2,006</u>	<u>1,915</u>	<u>1,758</u>
<u>Refuge Development Costs</u>							
Administrative Facilities							
-Aircraft hanger (Kaktovik)	615	615	615	615	615	615	615
-Storage shed (Arctic Village)	75	75	75	75	75	75	75
<u>Total \$</u>	<u>690</u>	<u>690</u>	<u>690</u>	<u>690</u>	<u>690</u>	<u>690</u>	<u>690</u>

a/ The estimates do not include the cost of managing the "1002" area if oil development occurs.

SELECTION OF THE PREFERRED ALTERNATIVE

The Service has selected Alternative A as its preferred alternative for managing Arctic Refuge on the basis that it would both satisfy the purposes of the refuge, and that it provides a balanced approach to meeting the needs and concerns of the public. The Service believes that designating all of the non-wilderness portions of the refuge as minimal management areas would adequately protect the refuge's resources and best meet the needs of local residents, refuge users, and the general public in the long-run. Minimal management will maintain options for the Service to address refuge management needs that may arise in the future. The Service would carefully monitor and regulate all uses and activities within the refuge to ensure that adverse impacts to refuge resources and users are minimized.

The Service will not begin to implement the management directions in the preferred alternative until at least 45 days following publication of a notice of availability of the Final Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement has appeared in the Federal Register. A record of decision will be published following the 45 day waiting period, and implementation of the plan can then start.

APPENDICES

APPENDIX A. List of Preparers.

The planning team for the Final Arctic National Wildlife Refuge Comprehensive Conservation Plan/Environmental Impact Statement bears primary responsibility for preparing the plan.

Arctic Refuge Planning Team

Elison, Glenn	Refuge Manager
Fruge, Doug	Fisheries Biologist
Garrett, Phil	Supervisory Fish and Wildlife Biologist
Kaye, Roger	Assistant Refuge Manager/Pilot
Nation, Mary Lynn	Fish and Wildlife Biologist
Olson, Norman	Planning Team Leader
Rees, Michael	Assistant Planner
Wassink, Connie	Public Involvement Specialist

Disciplinary Specialists and Support Staff

Diters, Chuck	Archaeologist
Gallagher, Patti	Graphics Specialist
Kirk, Bill	Botanist
Knauer, Bill	EIS Coordinator
Maloney, Jean	Computer Systems Analyst
Nichols, Gary	Cartographer
Seemel, Robert	Wilderness Specialist
Vandegraft, Doug	Lead Cartographer

Additional assistance provided by the following people is greatly appreciated.

Bakke, Arne	Geologist, Alaska Dept. of Natural Resources, Division of Geological and Geophysical Sciences, Fairbanks
Dillon, John	Geologist, Alaska Dept. of Natural Resources, Division of Geological and Geophysical Sciences (deceased)
Gasbarro, Tony	Extension Forester Specialist, Cooperative Extension Service, University of Alaska, Fairbanks
Keill, Don	Mining engineer, Arctic District, Bureau of Land Management, Fairbanks

APPENDIX B. Consultation and Coordination.

Numerous federal, state and local government agencies, Native organizations, special interest groups, private businesses, civic organizations, the media, and individuals were contacted during the preparation of the draft and final Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement. (The public involvement program is described in detail in Chapter II.) The Service received a total of 961 letters commenting on the draft Arctic Refuge plan. All correspondence received is on file at the U.S. Fish and Wildlife Service's Regional Office, 1011 E. Tudor Road, Anchorage, AK 99503. The following list notes some of the agencies, organizations and individuals that received copies of this final comprehensive conservation plan for the Arctic Refuge.

U.S. CONGRESS

Senator Ted Stevens
Senator Frank H. Murkowski
Representative Don Young
House of Representatives
 Subcommittee on Fish & Wildlife
Government Accounting Office

FEDERAL AGENCIES

Advisory Council on Historic Preservation
Alaska Federal-State Land Use Council
 Alaska Land Use Council Advisors
Department of Agriculture
 Soil Conservation Service
Department of Commerce
 Economic Development Administration
 National Marine Fisheries Service
 North Pacific Fishery Management Council
 National Oceanic and Atmospheric Administration
Department of Defense
 U.S. Army, Corps of Engineers
 Defense Mapping Agency, Hydro/Topo
Department of Energy
 Federal Energy Regulatory Commission
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
 Bureau of Indian Affairs
 Bureau of Land Management
 Alaska Resources Library
 Bureau of Mines
 Minerals Management Service
 National Park Service
 Alaska Public Lands Information Center
 Office of the Solicitor
 Office of Surface Mining
 U. S. Geological Survey

Department of State
Department of Transportation
 Federal Aviation Administration
 Federal Highway Administration
 U.S. Coast Guard
General Services Administration
 Federal Information Center
Marine Mammal Commission
National Science Foundation
U.S. Arctic Research Commission
U.S. Environmental Protection Agency

GOVERNMENT OF CANADA

Canadian Arctic Research Commission
Canadian Wildlife Service
Department of Indian Affairs
Embassy of Canada, Washington, D.C..
Northwest Territorial Government
 Dept. of Renewable Resources, Yellowknife
Yukon Territorial Government
 Dept. of Renewable Resources, Whitehorse

STATE OF ALASKA

Alaska Board of Fisheries
Alaska Board of Game
Alaska Power Authority*
Alaska State Legislature
Alaska State Library
Citizens Advisory Commission on Federal Areas
Department of Commerce and Economic Development*
Department of Community and Regional Affairs*
Department of Environmental Conservation*
Department of Fish and Game*
Department of Health and Social Services*
Department of Labor*
Department of Law*
Department of Military Affairs*
Department of Natural Resources*
Department of Public Safety*
 Division of Fish and Wildlife Protection
Department of Transportation and Public Facilities*
Office of the Governor*
 Division of Governmental Coordination
Oil and Gas Conservation Commission
University of Alaska, Anchorage
 Library (Government Documents)
 Institute for Social and Economic Research
 School of Economic and Public Affairs

*Executive branch agencies were contacted through the Office of the Governor,
Division of Governmental Coordination.

University of Alaska, Fairbanks
Arctic Environmental Information and Data Center
Cooperative Wildlife Research Unit
Elmer E. Rasmusen Library
Institute of Arctic Biology Library
University of Alaska, Juneau
Library (Government Documents)

LOCAL GOVERNMENTS, CIVIC ORGANIZATIONS, AND GENERAL CIRCULATION LIBRARIES

Anchorage, Municipality of
Anchorage Public Library System
Arctic Village School
Barrow, City of
Colorado State University
Library
Eastern Arctic Advisory Committee
Fairbanks-North Star Borough
Regional Library
Interior Regional Fish & Game Advisory Counsel
Kaktovik, City of
Keni Community Library
North Slope Borough
Seattle Public Library
Documents Library
Tanana Advisory Committee
University of California
Thos. Reynolds Law Library
Village Councils of
Arctic Village
Chalkyitsik
Kaktovik
Venetie
Western Arctic Advisory Committee

NATIVE ORGANIZATIONS

Alaska Eskimo Whaling Commission
Alaska Federation of Natives
Aleut Corporation
Arctic Slope Regional Corporation
Calista Corporation
Cook Inlet Region, Inc.
Inupiat Community of the Arctic Slope
Kaktovik Inupiat Corporation
Koniag Inc.
Doyon Ltd.
Chalkyitsik Native Corporation
Native Villages of
Fort Yukon
Venetie
Old Harbor Village Corporation
Tanana Chiefs Conference, Inc.

NEWS MEDIA

Alaska Public Radio Network
Alaska Television Network
Anchorage Daily News
Anchorage Times
Associated Press
Fairbanks Daily News Miner
Reuters News Service
Seattle Times
Tundra Times
United Press
and other media as appropriate

ORGANIZATIONS, SPECIAL-INTEREST GROUPS, AND PRIVATE BUSINESSES

Alaska Center for the Environment
Alaska Conservation Society
Alaska Legal Services Corp.
Alaska Miners Association, Inc.
Alaska Oil and Gas Association
Alaska Outdoor Council
Alaska Professional Hunters Association
Alaska Professional Sportfishing Association
Alaska Sportsmen's Council
Alaska State Chamber of Commerce
 Anchorage Chamber of Commerce
 Fairbanks Chamber of Commerce
Alaska Wilderness Council
Alaska Wilderness Guides Assn.
Alaska Wildlife Council
Amerada Hess
American Fisheries Society
American Petroleum Institute
American Wilderness Alliance
AMOCO Production Company
ARCO Alaska
Associated General Contractors
Bo-K Explorations
Center for Northern Studies
Champlin Oil Company
Chevron U.S.A., Inc.
COMINCO Alaska
Commonwealth North
CONOCO, Inc.
Dalco Oil Co.
Defenders of Wildlife
Diamond Shamrock Corp.
Environmental Defense Fund, Inc.
Exxon Company USA, Inc.
Freeport Minerals Company
Friends of Animals, Inc.

Friends of the Earth
Greenpeace U.S.A.
Hunt Oil Company
Institute of Ecology
International Association for Fish & Wildlife
International Moose Federation
Interior River- Users Group
Izaak Walton League
Kennecott Alaska Exploration
Marathon Oil Company
Mid-Continental Oil & Gas Association
Miners Advocacy Council
Mobil Oil Corporation
Murphy Oil Company
National Audubon Society
National Inholders Association
National Parks & Conservation Association
National Rifle Association
National Wildlife Federation
National Wildlife Refuge Association
Natural Gas Corp. of California
Natural Resources Defense Council
Nature Conservancy
Nerco Minerals Co.
Northern Alaska Environmental Center
Oxy Petroleum, Inc.
Pacific Coast Federation of Fishermen
Pennzoil Exploration & Production Co.
Petty-Ray Geophysical, Inc.
Phillips Petroleum
Placid Oil Company
Resource Development Council for Alaska
Rural Alaska Community Action Program, Inc.
Shell Oil Company
Shell Western E & P Inc.
Sierra Club
Sierra Club Legal Defense Fund
SOHIO Petroleum Corporation
Standard Alaska Production Co.
Sun Exploration & Production Co.
Tanana Valley Sportsmens Assn.
Tenneco Oil Co.
Terra Resources, Inc.
Texaco, Inc.
Texas Eastern Exploration Corp.
Trout Unlimited
Trustees for Alaska
The Wilderness Society
The Wildlife Society
UNOCAL
Union Texas Petroleum Corp.
Wildlife Management Institute

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APPENDIX D. Land Cover Type Classification for the Arctic Refuge.

A Landsat-derived land cover classification system was developed for the Arctic Refuge jointly by the Service and the U.S. Geological Survey (USGS). A total of 23 cover classes are included in the system. The following discussion describes each of the classes and lists some of the dominant plant species in each class. The species listed represent an approximate order of dominance within each cover class. The discussions also briefly describe the occurrence of each cover type on the refuge.

FORESTS - Forests are composed of trees at least 16 feet (5 m) tall. Included within the forest category are areas of secondary tree growth temporarily less than 16 feet in height (i.e., intermediate succession stages). The major forest classes identified within the refuge are: Closed Needleleaf; Open Needleleaf; Needleleaf Woodland; Deciduous; and Mixed Forest.

Class 1. Closed Needleleaf Forest. Percent tree cover in this class ranges from 60 to 100%. It consists primarily of Picea glauca on moist to well drained sites and is only found south of the continental divide. Species commonly found in the understory include Rosa acicularis, Shepherdia canadensis, Salix sp., Pyrola sp., Betula glandulosa, Vaccinium uliginosum, V. vitis-idaea, Carex sp., Eriophorum sp. and Hylocomium splendens.

Class 2. Open Needleleaf Forest. This class consists of open stands of trees (30 - 60% tree cover) with crowns not usually touching. It is primarily dominated by Picea mariana on low, poorly drained sites or upland sites with permafrost. Also included in the class is Picea glauca on alluvial sites and on moist to well drained sites in the uplands and subalpine zone.

The shrub layer usually consists of Salix glauca and Alnus crispa on alluvial and moist to well drained sites. The dwarf shrub layer is the more common type of understory occurring within this class and usually consists of Ledum decumbens or L. groenlandicum, Vaccinium uliginosum, Betula glandulosa, Empetrum nigrum, Eriophorum vaginatum, Cladonia sp. and Cladina sp. Other species which may include: Arctostaphylos rubra, A. arctica, Dryas integrifolia, Rhododendron sp., Salix reticulata, S. lanata, Carex bigelowii, Festuca altica, Equisetum arvensis and Hylocomium splendens.

Class 3. Needleleaf Woodland. -- This class is dominated by a shrub layer but contains an important stratum containing Picea mariana or P. glauca (5 - 30% tree cover and greater than 10 feet (3 m) in height). Major shrub species include Betula nana, Ledum groenlandicum, L. decumbens, Vaccinium uliginosum, V. vitis-idaea, Salix reticulata, S. glauca, S. lanata, Alnus crispa, and Dryas integrifolia. Non-woody species may include Lupinus arcticus, Equisetum arvense, E. scirpoides, Eriophorum vaginatum, Carex bigelowii, C. scirpoides, Festuca sp., Cetraria sp., Cladina sp., Polytrichum sp., Hylocomium splendens, and Dicranium sp.

Class 4. Deciduous Forest/Tall Shrub. -- Betula papyrifera, Populus tremuloides and P. balsamifera (25 - 100% tree cover) are the dominant species occurring in this class. Salix alexensis also may be found in this class on alluvial terraces by itself or mixed with P. balsamifera. This class is normally found on well-drained to moist soils associated with hills and alluvial terraces south of the continental divide. North of the divide this type is rare, occurring mainly along the Canning River. Also included are Alnus crispa and Salix sp., Rosa acicularis, Shepherdia canadensis, and Calamagrostis canadensis.

Class 5. Mixed Forest. This class is formed by deciduous broadleaf and evergreen needleleaf trees (25 - 100% tree cover) and occurs on well-drained to moist sites in the uplands. The primary needleleaf species is Picea glauca, while the major broadleaf species is Betula papyrifera and occasionally Populus balsamifera and P. tremuloides. Some alluvial sites are represented by tall Salix species that exceed 16 feet (5 m). This class is not abundant and is restricted to the south side of the Brooks Range below 1,640 feet (500 m) elevation. Understory species common to the needleleaf classes and the deciduous class also may be found in this class along with Ribes sp., Lupinus arcticus and Juniperus communis on drier sites.

SCRUB - This vegetation category is predominantly composed of shrubs (greater than 25% cover) 1.5 to 16 feet (0.5 to 5 m) high that shed their foliage simultaneously in fall.

Class 6. Alluvial Deciduous Scrub. This class occurs on frequently flooded gravel sites dominated by Salix planifolia ssp., S. pulchra and S. alexensis. On some sites, especially on the coastal plain, Betula species (dwarf birch) may occur with Salix in older alluvial terraces. The number of species occurring with the above as co-dominants or as understory are many and may include Salix lanata, S. richardsonii, S. glauca, S. brachycarpa, S. hastata, S. reticulata, Arctostaphylos rubra, Populus balsamifera, Shepherdia canadensis, Potentilla palustris, Dryas integrifolia, D. drummondii, Equisetum arvense, E. variegatum, E. scirpoides, Carex sp., Festuca sp., Juncus castaneus, Petasites sp., Hedysarum sp. and Hylocomium sp.

This class is not distinguishable on the coastal plain, but is included within the scarcely vegetated floodplain type. Species composition and density is usually controlled by frequency of flooding, water velocity and particle load during flooding.

Class 7. Dry Prostrate Dwarf Scrub. This class occupies slightly elevated microsites on the coastal plain and upper slopes in the foothills and mountains, and also may occur on dry alluvial terraces or fans above 1,000 feet (300 m) in the mountains. Bare soil is often an important component of this class as a result of frost action. Because of the harsh environment, plants do not achieve heights greater than 4 inches (10 cm). Some of the more commonly occurring shrubs are Dryas integrifolia (usually dominant), D. octopetala, Arctostaphylos rubra, Salix reticulata, S. oppositifolia, S. rotundifolia and Cassiopeia tetragona. Non-woody species include Saxifraga hircula, Polygonum bistorta, Petasites arctica, Polemonium sp., Equisetum arvense, Carex sp., Festuca sp., Hierochloa sp.

Epilobium latifolium, Geum glaciale and the lichen Cetraria sp.

Comparable types in Walker et al. (1982) include: IVb. Dry Prostrate Scrub, Forb Tundra; and Vb. Moist Sedge/Barren Tundra Complex (in part).

Class 8. Moist Prostrate Dwarf Scrub. This class contains prostrate dwarf shrub and sedge formations occupying mesic habitats on gentle to moderately steep slopes. In the foothills, these habitats are frequent on mid to lower slopes that receive subsurface drainage from adjacent terrain. Dryas integrifolia is often the dominant species. Equisetum arvense and the moss Tomenthypnum nitens are characteristic species of this formation. Carex bigelowii gives the habitat a hummocky surface. Moist habitats on slightly elevated microsites in the coastal plain, and alluvial terraces in the foothills and mountains are often drier as a result of greater exposure and lack of water from surrounding terrain. Lichens are more important than mosses in these drier habitats.

Other species important to this type include Salix arctica, S. lanata, S. pulchra, Rubus chamaemorus, Saxifraga hirculus, S. punctata, Petasites frigidus, Eriophorum vaginatum and Carex aquatilis.

This class corresponds to the following Walker et al. (1982) categories: Va. Moist Sedge, Prostrate Shrub Tundra; VIb. Moist Sedge Tussock, Dwarf Shrub Tundra (upland tussock tundra, alkaline facies); and VIIb. Moist Dwarf Shrub, Sedge Tussock Tundra (birch tundra).

Class 9. Mesic Erect Dwarf Scrub. This class also includes another possible class called Dwarf Scrub Graminoid Tussock. The class is comprised of erect dwarf shrubs, primarily from the taxa Betula sp., Salix sp., Vaccinium uliginosum and Cassiope tetragona. These shrubs are usually from 4 inches to 1.5 feet (0.1-0.5 m) in height with interlocking branches. This type is common on lower mountain slopes, low rolling hills, and old burns. On mountain bases with low slope values (0 - 15%) or on hill sides at lower elevations (below 2,950 feet (900 m)), graminoid tussocks often occur with the dwarf shrub. Major tussock-producing plants include Eriophorum vaginatum and Carex bigelowii. Major shrub species include Betula glandulosa, B. nana, Salix glauca, S. reticulata, S. planifolia ssp., S. pulchra, Ledum decumbens, Vaccinium vitis-idaea, and Empetrum nigrum. Other species present may include Carex lugens, Carex scirpoidea, Equisetum arvense, E. scirpoidea, Hylocomium splendens, Tomenthypnum nitens and Sphagnum sp.

Corresponding classes from Walker et al. (1982) are: VIIa. Moist Dwarf Shrub, Sedge Tussock Tundra (upland dwarf shrub, tussock tundra); and VIIc. Moist Sedge Tussock, Dwarf Shrub/Wet Dwarf Shrub Tundra Complex (water track complex).

HERBACEOUS - Herbaceous plants do not have significant woody tissue and die back to the ground surface each year. There are two major growth forms: graminoids; and forbs. Graminoids include all non-woody grasses and grasslike plants such as Carex (sedges) and Eriophorum (cottongrass). Forbs are broad-leaved herbaceous plants such as Petasites (coltsfoot) and Epilobium (fireweed). Four classes are recognized: Very Wet Graminoid; Wet Graminoid; Wet/Moist Dwarf Shrub Graminoid; and Moist Graminoid Tussock-Scrub.

Class 10. Very Wet Graminoid. This class is a graminoid-dominated formation associated with aquatic habitats surrounding large, open bodies of fresh water, very wet habitats that contain numerous small bodies of open water and coastal habitats frequently inundated with salt water. Surface forms include low-centered polygons with abundant standing water, thaw lake basins, the littoral zones of lakes and the coastline. Arctophila fulva is the primary species in deeper water, up to 3 feet (1 m) deep, with Carex aquatilis, Eriophorum scheuchzeri and Eriophorum angustifolium dominating areas where the water is less than 1 foot (30 cm) deep.

Corresponding classes of Walker et al. (1982) are: IIIb. Wet Sedge Tundra (very wet complexes); and IIIc. Wet Sedge Tundra (saline facies). It also corresponds to the Bergman et al. (1977) classes: II. Shallow Carex; and V. Basin Complex.

Class 11. Wet Graminoid. These are graminoid formations associated with wet habitats. These habitats often receive water by surface and subsurface flow from surrounding terrain. The habitats generally have standing water throughout the summer. Vegetation coverage is continuous, as depth of water is not a limiting factor to plant establishment and growth. The habitat has few drained microsites associated with polygon rims, strangmoor, hummocks, etc. Landforms where these habitats occur are river deltas, drained lake basins, and river channels where surface forms are low centered polygons and strangmoor. Primary taxa include numerous Carex sp., Eriophorum sp. Common species occurring in this type include Carex aquatilis, C. microglochin, C. atrofusca, C. amblyorhyncha, C. scirpoidea, C. rustrata, C. bigelowii, C. physocarpa, C. misandra, Eriophorum vaginatum, E. angustifolium, E. russeolum, Equistum fluviatile, Scirpus scurpoides, S. caespitosus, Pedicularis sp., Valeriana capitata, Polygonum sp., Tomenthypnum nitens and Drapanocladus sp. Some shrub species include Arctostaphylos rubra, Salix lanata, and S. arctophila.

The corresponding class of Walker et al. (1982) is IIIa. Wet Sedge Tundra (noncomplex). This class is also similar to the Bergman et al. (1977) 1. Flooded Tundra and may also be similar to that reported by Hettiger and Janz (1974) as I. Wet Sedge Meadows.

Class 12. Moist/Wet Tundra Complex. In this class dwarf shrubs and graminoids occur together in habitats intermediate in moisture regimes between the wet graminoid and moist dwarf shrub formations. High-centered and low-centered polygons are common surface features in river delta and drained lake basin landforms. Along river drainages, disjunct string bogs are the most common land surface form. Wet and moist microsites are often intermixed in a complex pattern in this habitat. Common species on these sites include Dryas integrifolia, Salix lanata, S. reticulata, Cassiope tetragona, Vaccinium uliginosum, Eriophorum triste, E. vaginatum, Carex bigelowii, C. membranacea, Polygonum bistorta, Stellaria laeta, Senecio sp., Tomenthypnum nitens and Hylocomium sp.

Comparable Walker et al. (1982) types are: IVa. Moist/Wet Sedge Tundra Complex; and IIIc. Wet Sedge Tundra (moist complexes).

Class 13. Moist Graminoid Tussock. This class is related to part of the class Mesic Erect Dwarf Scrub. Moist Graminoid Tussock differs from the latter class in that it is dominated by the graminoid component. In essence, the recognition of these two classes acknowledges the physiognomic continuum and attempts to distinguish classes based on the relative abundance of dwarf shrubs and the graminoid tussocks. Species dominating this class include the tussock-producing Eriophorum vaginatum and Carex bigelowii. Also occurring are Betula nana, Salix planifolia, S. pulchra, S. reticulata, Dryas integrifolia, Vaccinium uliginosum, V. vitis-idaea, Pyrola sp., Polygonum bistorta, P. viviparum, Cetraria sp., Tomenthypnum nitens, Hylocomium splendens, and Ptilidium ciliare.

The corresponding type from Walker et al. (1982) is VIa. Moist Sedge Tussock, Dwarf Shrub Tundra (upland tussock tundra, acid facies).

SCARCELY VEGETATED AREAS - In this category plants are scattered or absent and bare mineral soil or rock determines the overall appearance of the landscape.

Class 14. Barren Floodplain. This class consists of alluvium including silt, sand and rocks. Plant cover is less than 5% and includes the same species described below for Scarcely Vegetated Floodplain if any vegetation is present at all.

Class 15. Barren Scree. This class usually has less than 5% plant cover. A type of lichen tundra may form dominated by blackish lichens, particularly the genera Umbilicaria, Cetraria, Cornicularia, and Pseudophebe. These plants are on the very limit of life. These sites may be devoid of flowering plants.

Class 16. Scarcely Vegetated Floodplain. This class is a result of the initial invasion of plants on recent river alluvium. Plant cover averages 5 to 20%. Some of the more common species include Epilobium latifolium, Calamagrostis canadensis, Bromus sp. and Salix sp. On the coastal plain (below 1,640 feet (500 m) elevation) this type includes alluvial deciduous scrub communities.

Class 17. Scarcely Vegetated Scree. With 5 to 20% plant cover, this class is comprised of more or less unstable steep slopes of stones beneath weathering rocks. It is a very open fellfield and often grades into Dry Prostrate Dwarf Scrub. Some shrubs commonly found in this type in prostrate or decumbent forms include Betula nana, Dryas integrifolia, D. octopetala, Vaccinium uliginosum, Cassiope tetragona, and Salix phlebophila. Some other species found include Umbilciana sp., Cryptopteris sp., Diapensia lapponica, Cetraria sp., Lupinus arcticus, and Carex sp.

OTHER - There are several cover types that do not fit in the above categories.

Class 18. Clear Water. Clear water includes lakes, ponds and rivers.

Class 19. Shallow Water. This class includes riverine areas in which the water is shallow. However, it may also show where the satellite sensor received spectral data from both water and gravel bars and recorded them as one class.

Class 20. Offshore Water. The Beaufort Sea shoreline was digitized on the Flaxman Island, Barter Island, Demarcation Point and Mt. Michelson 1:250,000 scale quadrangle sheets and applied to the land cover image. Those water areas north of the shoreline were labeled offshore water.

Class 21. Clouds/Snow/Ice. This type is highly variable and is dependent upon individual yearly weather patterns. Ice, in the form of pack ice and augeis may or may not be present on the ground or in the ocean as depicted on the map. Glacial ice in the mountains can be considered stable for the useful life of this land cover classification, and what is shown on the map could probably be found on the ground. This may not be true of the Philip Smith Mountains quadrangle sheet, however, as the scene used contained an early snow fall.

Class 22. Shadow. This class includes both terrain shadow (i.e. mountain shadow) and cloud shadow.

Class 23. Roads. The Dalton Highway (or North Slope Haul Road) and Trans-Alaska Pipeline were digitized and added to the Sagavanirktok and Philip Smith Mountains quadrangle sheets.

Appendix E. Fishes of the Arctic Refuge.^{a/}

Species	Freshwater	Anadromous	Marine
Lampreys			
Arctic lamprey (<u>Lampetra japonica</u>)		*	
Herrings			
Pacific herring (<u>Clupea harengus pallasi</u>)			*
Whitefishes			
Inconnu (sheefish) (<u>Stenodus leucichthys</u>)	*		
Least cisco (<u>Coregonus sardinella</u>)		*	
Bering cisco (<u>Coregonus laurettae</u>)		*	
Arctic cisco (<u>Coregonus autumnalis</u>)		*	
Round whitefish (<u>Prosopium cylindraceum</u>)	*		
Broad whitefish (<u>Coregonus nasus</u>)		*	
Humpback whitefish (<u>Coregonus pidschian</u>)		*	
Trouts and Salmon			
Lake trout (<u>Salvelinus namaycush</u>)	*		
Arctic char (<u>Salvelinus alpinus</u>)		*	
Pink salmon (<u>Oncorhynchus gorbuscha</u>)		*	
Chinook salmon (<u>Oncorhynchus tshawytscha</u>)		*	
Chum salmon (<u>Oncorhynchus keta</u>)		*	
Coho salmon (<u>Oncorhynchus kisutch</u>)		*	
Grayling			
Arctic grayling (<u>Thymallus arcticus</u>)	*		
Smelts			
Rainbow smelt (<u>Osmerus mordax</u>)		*	
Capelin (<u>Mallotus villosus</u>)			*
Pikes			
Northern pike (<u>Esox lucius</u>)	*		
Minnnows			
Lake chub (<u>Couesius plumbeus</u>)	*		
Suckers			
Longnose sucker (<u>Catostomus catostomus</u>)	*		
Trout-perches			
Trout-perch (<u>Percopsis omiscomaycus</u>)	*		

^{a/}Habitat/life history patterns are indicated by asterisks. Sources: Morrow, 1980; Smith and Glesne, 1983; and Garner and Reynolds, 1986.

Species	Freshwater	Anadromous	Marine
Codfishes			
Burbot (<u>Lota lota</u>)	*		
Arctic cod (<u>Boreogadus saida</u>)			*
Saffron cod (<u>Eleginus gracilis</u>)			*
Sticklebacks			
Ninespine stickleback (<u>Pungitius pungitius</u>)	*		
Sculpins			
Slimy sculpin (<u>Cottus cognatus</u>)	*		
Fourhorn sculpin (<u>Myoxocephalus quadricornis</u>)			*
Arctic sculpin (<u>Myoxocephalus scorpioides</u>)			*
Snailfishes			
Unidentified snailfish (<u>Liparis sp</u>)			*
Sand lances			
Pacific sand lance (<u>Ammodytes hexapterus</u>)			*
Pricklebacks			
Slender eelblenny (<u>Lumpenus fabricii</u>)			*
Stout eelblenny (<u>Lumpenus medius</u>)			*
Eelpouts			
Unidentified eelpouts (<u>Lycodes</u>)			*
Flounders			
Arctic flounder (<u>Liopsetta glacialis</u>)			*
Starry flounder (<u>Platichthys stellatus</u>)			*

Appendix F. Birds of the Arctic Refuge.

The following species may be found on the Arctic Refuge. The majority have been documented. For a few species the qualifier "probable" is included which indicates occurrence is likely but not documented. This list was adapted from Spindler (1984). Nomenclature follows AOU (1983). Status and abundance are based on Kessel and Gibson (1978). Definitions of terminology are as follows:

resident -	present throughout the year.
migrant -	seasonal transient between winter and breeding ranges; includes spring "overshoots".
breeder -	known to breed on the refuge.
visitor -	non-breeding species, or a species not directly enroute between breeding and wintering areas.
abundant -	occurs repeatedly in proper habitats with a available habitat heavily utilized.
common -	occurs in all or nearly all proper habitats with some available habitat sparsely utilized.
fairly common -	occurs in only some of proper habitat with large areas of available habitat unoccupied.
uncommon -	occurs regularly but utilizes little of the suitable habitat.
rare -	within its normal range occurring regularly but in very small numbers.
casual -	beyond normal range but irregular observations occur over several years.
accidental -	so far from its normal range that further observations are unlikely.

Species	Status, Abundance, and Distribution
Red-throated loon	Common breeder in north slope wetlands; abundant summer resident along the arctic coast; rare visitor in the Brooks Range.
Arctic loon	Common breeder in north and south slope ponds and lakes; abundant summer resident along the arctic coast; uncommon breeder in the Brooks Range.
Common loon	Uncommon breeder in south slope lakes; rare visitor along the arctic coast.
Yellow-billed loon	Rare breeder on large inland coastal plain lakes; uncommon summer resident and common migrant along the arctic coast.
Horned grebe	Common breeder in wetlands of the south slope; rare summer visitor to the north slope.

Species	Status, Abundance, and Distribution
Red-necked grebe	Uncommon breeder in wetlands of the south slope; rare summer visitor to north slope and coastal lagoons.
Short-tailed shearwater	Uncommon fall migrant along the arctic coast.
Tundra swan	Common breeder in north slope lakes and wetlands.
Trumpeter swan	Rare visitor to the north slope.
Greater white-fronted goose	Rare breeder and common migrant on the north slope.
Snow goose	Uncommon migrant on the south slope, Brooks Range, and north slope in June; abundant migrant, sometimes forming aggregations of up to 300,000 birds, during August and September on the north slope.
Ross' goose	Casual visitor to the north slope.
Brant	Uncommon breeder in widely-scattered colonies in wetlands near the arctic coast; abundant migrant along the coast.
Canada goose	Uncommon breeder along rivers of the north and south slope, common fall migrant on the north slope.
Green-winged teal	Common breeder in the Brooks Range and south slope; rare breeder inland on the north slope.
Mallard	Uncommon breeder and common summer resident on the south slope and in the Brooks Range; rare visitor on the north slope.
Northern pintail	Common breeder on the south slope; uncommon breeder and occasionally abundant summer resident on the north slope.
Northern shoveler	Uncommon breeder on the south slope; uncommon visitor on the north slope.
Eurasian wigeon	Casual visitor on the north slope.
American wigeon	Common breeder in the Brooks Range and on the south slope, uncommon visitor to the north slope.
Canvasback	Rare visitor to the south slope.
Greater scaup	Probable uncommon breeder in north slope wetlands; common migrant along the arctic coast; uncommon visitor to the Brooks Range.
Lesser scaup	Abundant breeder on the south slope, common breeder in the Brooks Range, rare breeder inland on the north slope.
Common eider	Uncommon breeder on coastal barrier islands and coastal north slope gravel bars, wetlands; common migrant along the arctic coast.

Species	Status, Abundance, and Distribution
King eider	Uncommon breeder on coastal north slope wetlands; common migrant along the coast: may remain in offshore ice leads in Beaufort Sea well after freeze-up has occurred on the north slope.
Spectacled eider	Rare breeder on north slope wetlands, otherwise uncommon summer resident on the north slope near the coast.
Steller's eider	Rare breeder and summer resident on the north slope near the coast.
Harlequin duck	Uncommon breeder along fast-flowing rivers in the Brooks Range and north and south slopes.
Oldsquaw	Common breeder in wetlands of the north slope and mountains; uncommon migrant on the south slope; abundant migrant along coastal lagoons where aggregations may number 10 to 30,000 late July to early September.
Black scoter	Uncommon migrant along the arctic coast.
Surf scoter	Uncommon breeder on the south slope; common summer resident and migrant along the arctic coast.
White-winged scoter	Common breeder in wetlands on the south slope and Brooks Range; common summer resident and migrant along the arctic coast.
Common goldeneye	Probable uncommon breeder on the south slope; rare visitor to the north slope.
Barrow's goldeneye	Probable uncommon visitor to the south slope and Brooks Range.
Bufflehead	Common breeder in south slope river valleys near ponds and lakes below timberline.
Common merganser	Accidental visitor.
Red-breasted merganser	Common breeder along rivers in the Brooks Range; uncommon summer resident on north slope rivers; common summer resident and migrant along Beaufort Sea coastal lagoons.
Bald Eagle	Rare breeder and uncommon summer resident along rivers on the south slope.
Northern harrier	Probable uncommon breeder; common summer resident in alpine tundra of the Brooks Range; uncommon summer resident in arctic tundra of the coastal plain.
Sharp-shinned hawk	Uncommon summer resident in timbered parts of the south slope.

Species	Status, Abundance, and Distribution
Northern goshawk	Uncommon breeder in timbered country of the south slope; rare visitor to the Brooks Range and north slope.
Rough-legged hawk	Common breeder in the Brooks Range; uncommon breeder on the north and south slopes.
Golden eagle	Common breeder in mountains; common summer resident associated with calving caribou on the north slope; uncommon visitor elsewhere.
American Kestrel	Uncommon breeder on the south slope; rare visitor to the north slope.
Merlin	Uncommon breeder along rivers in the Brooks Range; rare visitor elsewhere.
Peregrine falcon	Very rare breeder on cliffs along rivers of the south slope, uncommon visitor and/or migrant elsewhere.
Gryfalcon	Uncommon breeder in the Brooks Range, uncommon resident elsewhere.
Spruce Grouse	Uncommon resident and probable breeder in coniferous forests of the south slope.
Willow ptarmigan	Abundant breeder; uncommon winter resident in tundra shrub thickets and near treeline.
Rock ptarmigan	Common breeder in alpine tundra in the Brooks Range and near coastal tundra on the north slope; uncommon winter resident.
Sandhill crane	Uncommon summer resident and probable breeder on the north and south slopes.
Black-bellied plover	Rare breeder and common fall migrant on the north slope.
Lesser golden-plover	Common breeder in alpine and arctic tundra of the Brooks Range and north slope.
Semipalmated plover	Common breeder along rivers in the Brooks Range, south slope, and interior coastal plain.
Killdeer	Casual visitor to the north slope.
Eurasian dotterel	Accidental visitor to the north slope.
Lesser yellowlegs	Abundant breeder in south slope wetlands; rare visitor to the north slope.
Solitary sandpiper	Abundant breeder in south slope wetlands near forests.
Wandering tattler	Common breeder along creeks and rivers in the Brooks Range.
Spotted sandpiper	Common breeder along rivers in the Brooks Range and on the south slope; uncommon on the interior coastal plain.
Upland sandpiper	Common breeder in the Brooks Range and its northern foothills as well as treeline hills of the south slope.

Species	Status, Abundance, and Distribution
Whimbrel	Uncommon breeder in the Brooks Range and treeline hills of the south slope; rare visitor to the north slope.
Hudsonian godwit	Rare visitor to the north slope.
Bar-tailed godwit	Rare migrant and visitor to the north slope.
Ruddy turnstone	Uncommon breeder along north slope rivers; common fall migrant along the coast.
Surfbird	Rare breeder in high alpine tundra in the Brooks Range.
Red knot	Rare migrant on the north slope.
Sanderling	Rare breeder and uncommon migrant on the north slope.
Semipalmated sandpiper	Common to locally abundant breeder on the north slope.
Western sandpiper	Uncommon migrant on the north slope.
Least sandpiper	Common breeder in wet and moist tundra of the Brooks Range and south slope; rare visitor to the southern north slope.
White-rumped sandpiper	Uncommon breeder and migrant near the arctic coast on the north slope.
Baird's sandpiper	Uncommon breeder on arctic tundra and river gravel bars of the north slope and in alpine tundra of the Brooks Range.
Pectoral sandpiper	Abundant breeder on the north slope.
Dunlin	Uncommon breeder on the western third of the coastal plain, otherwise uncommon summer resident and common migrant on the north slope near the coast.
Stilt sandpiper	Uncommon breeder and common fall migrant on the north slope.
Buff-breasted sandpiper	Uncommon breeder on the north slope.
Long-billed dowitcher	Uncommon breeder but occasionally abundant summer resident on the north slope.
Common snipe	Common breeder on the south slope and in the Brooks Range, locally common breeder on the interior of the north slope coastal plain.
Red-necked phalarope	Common breeder on the coastal plain, Brooks Range, and south slope wetlands; abundant migrant along the arctic coast.
Red phalarope	Common breeder and abundant migrant on the north slope near the coast.
Pomarine jaeger	Common spring migrant on the north slope, especially in association with calving caribou, otherwise uncommon to locally-common breeder and summer resident; common spring migrant through the Canning River valley; uncommon fall migrant on the north slope.

Species	Status, Abundance, and Distribution
Parasitic jaeger	Uncommon breeder on the north slope; rare breeder in the Brooks Range north of the continental divide; common spring migrant through the Canning River valley.
Long-tailed jaeger	Common breeder on the north slope and in alpine tundra of the Brooks Range; common spring migrant through the Canning River valley and along the Beaufort Sea coast.
Bonaparte's gull	Uncommon breeder in south slope wetlands, casual visitor to the north slope.
Mew gull	Common breeder in wetland areas of the south slope and Brooks Range.
Herring gull	Uncommon breeder in wetlands of the south slope and Brooks Range; uncommon visitor to the arctic coast.
Thayer's gull	Uncommon visitor to the arctic coast.
Slaty-backed gull	Rare visitor to the arctic coast.
Glaucous gull	Common breeder in wetlands near the arctic coast, uncommon visitor on the inland coastal plain and north side of the Brooks Range; abundant migrant along the coast.
Black-legged kittiwake	Uncommon visitor on the Beaufort Sea and coastal plain.
Ross' gull	Rare migrant along the arctic coast in September.
Sabine's gull	Uncommon breeder in wetlands along the arctic coast; common fall migrant along the arctic coast.
Ivory gull	Rare migrant along the arctic coast.
Arctic tern	Uncommon breeder and common summer resident in wetlands, the south slope and Brooks Range; uncommon breeder on islets in coastal wetlands, gravel bars, and barrier islands of the north slope; abundant fall migrant along the arctic coast.
Thick-billed murre	Uncommon visitor to the Beaufort Sea and along the coastline.
Black guillemot	Uncommon breeder in driftwood and man-made trash along barrier islands.
Horned puffin	Casual visitor on the Beaufort Sea.
Great horned owl	Uncommon to rare resident in forested parts of the south slope.
Snowy owl	Uncommon breeder, occasionally common resident on the north slope, uncommon winter resident elsewhere.
Northern hawk-owl	Uncommon breeder in forested area of the south slope.

Species	Status, Abundance, and Distribution
Great gray owl	Probable resident in south slope forests.
Short-eared owl	Uncommon breeder and common summer resident in alpine areas of the south slope, Brooks Range and north slope coastal plain tundra
Boreal owl	Probable resident in south slope forests.
Common nighthawk	Casual visitor to the north slope.
Rufous hummingbird	Rare visitor to the south slope and Brooks Range.
Belted kingfisher	Uncommon summer resident and possible breeder along south slope rivers.
Downy woodpecker	Uncommon resident in south slope forests.
Hairy woodpecker	Probable uncommon resident in south slope forests.
Three-toed woodpecker	Uncommon breeder in south slope forests.
Northern flicker	Uncommon breeder in south slope forests, and tall shrub thickets of Brooks Range
Olive-sided flycatcher	Uncommon breeder in south slope woodlands.
Alder flycatcher	Common breeder in riparian shrub thickets of the south slope.
Say's phoebe	Common breeder in cliff habitat along rivers in the Brooks Range; accidental visitor to the north slope.
Eastern kingbird	Accidental visitor to the north slope.
Horned lark	Common breeder in alpine tundra from south slope foothills to northern foothills of the Brooks Range.
Tree swallow	Uncommon breeder on the south slope.
Violet-green swallow	Uncommon breeder on the south slope and on the south side of the Brooks Range.
Bank swallow	Uncommon summer visitor and probable uncommon breeder on the south slope.
Cliff swallow	Locally common breeder in colonies along rivers and creeks in the Brooks Range and south slope.
Barn swallow	Rare visitor to the north slope.
Gray jay	Common breeder, uncommon resident in forests of the south slope; rare in shrub thickets of the Brooks Range as far north as Marsh Fork of the Canning River.
Common Raven	Uncommon breeder on cliffs of the south slope and Brooks Range; uncommon resident throughout; breeds locally in towers at Kaktovik.
Black-capped chickadee	Probable uncommon resident in deciduous forests, extreme southern portions of the refuge.
Siberian tit	Rare and local breeder in the Brooks Range.
Boreal chickadee	Uncommon resident of the south slope.

Species	Status, Abundance, and Distribution
American dipper	Uncommon breeder and resident in rivers with year-round springs on the south slope and Brooks Range, and in Sadlerochit Springs on the north slope
Arctic Warbler	Uncommon breeder in shrub thickets and deciduous forest of the south slope and Brooks Range.
Ruby-crowned kinglet	common breeder on the south slope and Brooks Ranger coniferous forests and woodlands.
Bluethroat	Rare visitor to the north slope.
Northern wheatear	Common breeder on high alpine tundra of the Brooks Range.
Townsend's solitaire	Uncommon probable breeder, uncommon summer resident in coniferous forests of the south slope and south side of the Brooks Range.
Gray-checked thrush	Abundant breeder near tree-line and in tree-shrub woodlands of the south slope and south side of the Brooks Range.
Swainson's thrush	Uncommon probable breeder, uncommon summer resident of the south slope.
Hermit thrush	Casual visitor on the south side of the refuge, in the Porcupine River area.
American robin	Abundant breeder in south slope woodlands; uncommon breeder in Brooks Range shrub thickets; rare visitor to the north slope.
Varied thrush	Common breeder in south slope woodlands and forests; rare visitor to the north slope.
Yellow wagtail	Common breeder in or near shrub thickets surrounded by tundra on the interior coastal plain and northern foothills of the Brooks Range; rare visitor to the south slope.
Water pipit	Common breeder in wet alpine tundra in the Brooks Range; uncommon breeder along wet river bluffs of the interior coastal plain.
Bohemian waxwing	Common summer resident and probable breeder in south slope woodlands.
Cedar waxwing	Accidental visitor to the north slope.
Northern shrike	Common breeder in shrub thickets in the Brooks Range and south slope.
Orange-crowned warbler	Uncommon breeder in deciduous forests and shrub thickets of the south slope; casual migrant on the north slope.
Yellow warbler	Uncommon breeder in tall shrub thickets of the south slope; rare breeder in shrub thickets on the north side of the Brooks Range; casual migrant on the north slope.

Species	Status, Abundance, and Distribution
Yellow-rumped warbler	Common breeder in forests and woodlands of the south slope; rare breeder in tall shrub thickets and dwarf forests in the Brooks Range.
Blackpoll warbler	Probable uncommon breeder and uncommon summer resident in riparian shrub thickets and woodlands of the south slope.
Northern waterthrush	Probable uncommon breeder and uncommon summer resident in riparian shrub thickets on the south slope.
Wilson's warbler	Uncommon breeder in shrub thickets on the south slope; casual migrant to the north slope.
American tree sparrow	Abundant breeder in low willow thickets on the south slope throughout the Brooks Range; uncommon breeder in low willows of the north slope.
Chipping sparrow	Casual visitor in the southern part of the refuge, in the Porcupine River area.
Savannah sparrow	Common breeder in low shrub-grass meadows of the south slope, Brooks Range, and north slope
Clay-colored sparrow	Accidental visitor.
Fox sparrow	Comon breeder in tall shrub thickets of the south slope and Brooks Range; casual migrant on the north slope.
White-throated sparrow	Accidental visitor to the north slope.
Golden-crowned sparrow	Rare visitor to the Brooks Range.
White-crowned sparrow	Abundant breeder in woodlands and shrub thickets on the south slope; common breeder in shrub thickets in the Brooks Range; rare visitor to the north slope.
Dark-eyed junco	Abundant breeder in woodlands of the south slope; rare migrant to the north slope.
Lapland longspur	Abundant breeder in alpine and arctic tundra of the Brooks Range to the north slope; common migrant on the south slope.
Smith's longspur	Common breeder in rocky alpine tundra of the Brooks Range; uncommon visitor to the north slope.
Snow bunting	Uncommon breeder in rocky alpine tundra and in driftwood and debris on barrier islands of the Beaufort Sea; abundant breeder in Kaktovik.
Red-winged blackbird	Accidental visitor to the north slope.

Species	Status, Abundance, and Distribution
Rusty blackbird	Common breeder on the south slope; uncommon breeder in the Brooks Range; casual migrant on the north slope.
Brown-headed cowbird	Accidental visitor to the north slope.
Rosy finch	Uncommon breeder in high alpine areas and cliffs near rivers in the Brooks Range.
Pine grosbeak	Uncommon probable breeder in south slope coniferous forests, uncommon resident on the south slope.
White-winged crossbill	Uncommon breeder to locally abundant breeder in coniferous forests of the south slope and Brooks Range.
Common redpoll	Uncommon breeder in forests and shrub thickets of the south slope; probable winter resident on the south slope; rare visitor to the north slope.
Hoary redpoll	Uncommon breeder in shrub thickets of the Brooks Range south slope and north slope; winter resident of the south slope.
Pine siskin	Uncommon summer resident in forested areas of the south slope and Brooks Range; rare visitor to the north slope.

Appendix G. Mammals of the Arctic Refuge.

Species	Status
Cinereous shrew (<u>Sorex cinereus</u>)	Occurs throughout
Dusky shrew (<u>Sorex obscurus</u>)	Occurs southern part
Arctic shrew (<u>Sorex arcticus</u>)	Occurs throughout
Pigmy shrew (<u>Microsorex hoyi</u>)	Occurs southern part
Snowshoe hare (<u>Lepus americanus</u>)	Occurs primarily on south part
Red squirrel (<u>Tamiasciurus hudsonicus</u>)	Occurs southern part
Arctic marmot (<u>Marmota broweri</u>)	Occurs in mountainous areas
Arctic ground squirrel (<u>Citellus parryi kenicotti</u>)	Occurs throughout
Arctic ground squirrel (<u>Citellus parryi osgoodi</u>)	Present south side
Beaver (<u>Castor canadensis</u>)	Occurs south side
Varying lemming (<u>Dicrostonyx torquatus</u>)	Occurs throughout
Bog lemming (<u>Synaptomys borealis</u>)	Occurs southern part
Brown lemming (<u>Lemmus sibiricus</u>)	Occurs northern part
Red-backed vole (<u>Clethrionomys rutilus</u>)	Occurs throughout
Northern vole (<u>Microtus oeconomus</u>)	Occurs southern part
Narrow-skulled vole (<u>Microtus miurus</u>)	Occurs throughout
Meadow jumping mouse (<u>Zapus hudsonicus</u>)	Occurs southern part
Porcupine (<u>Erethizon dorsatum</u>)	Occurs throughout
Ermine (<u>Mustela erminea</u>)	Occurs throughout
Least weasel (<u>Mustela nivalis</u>)	Occurs throughout
Mink (<u>Mustela vison</u>)	Occurs southern part
Otter (<u>Lutra canadensis</u>)	Occurs southern part, occasionally northern part
Marten (<u>Martes americana</u>)	Occurs southern part
Lynx (<u>Felix canadensis</u>)	Occurs southern part
Muskrat (<u>Ondatra zibethicus</u>)	Occurs southern part
Polar bear (<u>Ursus maritimus</u>)	North part
Brown bear (<u>Ursus arctos</u>)	Occurs throughout
Black bear (<u>Ursus americanus</u>)	Occurs southern part
Moose (<u>Alces alces</u>)	Occurs throughout
Caribou (<u>Rangifer tarandus</u>)	Occurs throughout
Mountain sheep (<u>Ovis dalli</u>)	Confined to mountainous portion
Coyote (<u>Canis latrans</u>)	Few throughout
Wolf (<u>Canis lupus</u>)	occurs throughout
Arctic fox (<u>Alopex lagopus</u>)	Occurs northern part
Red Fox (<u>Vulpes vulpes</u>)	Occurs throughout
Wolverine (<u>Gulo gulo</u>)	Occurs throughout
Walrus (<u>Odobenus rosmarus</u>)	Rare on coast
Ringed seal (<u>Phoca hispida</u>)	Found on the coast
Bearded seal (<u>Erignathus barbatus</u>)	Found on the coast
Beluga whale (<u>Delphinapterus leucas</u>)	Along coast
Nar whale (<u>Monodon monoceros</u>)	Rare along coast
Gray whale (<u>Eschrichtius gibbosus</u>)	Uncommon along coast
Bowhead whale (<u>Balaena mysticetus</u>)	Common along coast
Muskox (<u>Ovibos moschatus</u>)	On north side

APPENDIX H.

**MASTER MEMORANDUM OF UNDERSTANDING
BETWEEN
THE ALASKA DEPARTMENT OF FISH AND GAME
Juneau, Alaska
AND
THE U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR
Anchorage, Alaska**

This Master Memorandum of Understanding between the State of Alaska, Department of Fish and Game, hereinafter referred to as the Department, and the U.S. Fish and Wildlife Service, hereinafter referred to as the Service, reflects the general policy guidelines within which the two agencies agree to operate.

WHEREAS, the Department, under the Constitution, laws and regulations of the State of Alaska (Appendix I), is responsible for the management, protection, maintenance, enhancement, rehabilitation, and extension of the fish and wildlife resources of the State on the sustained yield principle, subject to preferences among beneficial uses; and

WHEREAS, the Service, by authority of the Constitution, laws of Congress and regulations of the U.S. Department of Interior (Appendix II) has a mandated management responsibility for certain species or classes of wildlife and is responsible for the management of Service lands in Alaska, and the conservation of fish and wildlife resources on these lands; and

WHEREAS, the Department and the Service share a mutual concern for fish and wildlife resources and their habitats and both are engaged in extensive fish and wildlife conservation, management, and protection programs and desire to develop and maintain a cooperative relationship which will be in the best interests of both parties, the concerned fish and wildlife resources and their habitats, and produce the greatest public benefit; and

WHEREAS, it has been recognized in the Alaska National Interest Lands Conservation Act and subsequent implementing Federal regulations that the resources and use of Service lands in Alaska are substantially different than those of other states; and

WHEREAS, the Department and the Service recognize the increasing need to coordinate resource planning and policy development;

NOW, THEREFORE, the parties hereto do hereby agree as follows:

THE DEPARTMENT OF FISH AND GAME AGREES:

1. To recognize the Service as the agency with the responsibility to manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use.
2. To manage fish and resident wildlife populations in their natural species diversity on Service lands.
3. To consult with the Regional Director in a timely manner and comply with applicable Federal laws and regulations before embarking on enhancement or construction activities on Service lands.

THE FISH AND WILDLIFE SERVICE AGREES:

1. To recognize the Department as the agency with the primary responsibility to manage fish and resident wildlife within the State of Alaska.
2. To recognize the right of the Department to enter onto Service lands at any time to conduct routine management activities which do not involve construction, disturbance to the land, or alterations of ecosystems.
3. To cooperate with the Department in planning for enhancement or development activities on Service lands which require permits, environmental assessments, compatibility assessments, or similar regulatory documents by responding to the Department in a timely manner with requirements, time tables, and any other necessary input.
4. To manage the fish and wildlife habitat on Service lands so as to insure conservation of fish and wildlife populations and their habitats in their natural diversity.
5. To consider carefully the impact of any proposed treaties or international agreements relating to fish and wildlife resources on the State of Alaska which could diminish the jurisdictional authority of the State and to consult freely with the State when these treaties or agreements have a primary impact on the State.
6. To review present U.S. Fish and Wildlife Service policies and any future proposed changes in those policies in consultation with the Department to determine if modified or special policies are needed for Alaska.
7. To adopt refuge management plans whose provisions--including provision for animal damage control--are in substantial agreement with the Department's fish and wildlife management plans, unless such plans are determined formally to be incompatible with the purposes for which the respective refuges were established.
8. To utilize the State's regulatory process to maximum extent allowed by Federal law in developing new or modifying existing Federal regulations or proposing changes in existing State regulations governing or affecting the taking of fish and wildlife on Service lands in Alaska.

THE DEPARTMENT OF FISH AND GAME AND THE FISH AND WILDLIFE SERVICE MUTUALLY AGREE:

1. To coordinate planning for management of fish and wildlife resources on Service lands so that conflicts arising from differing legal mandates, objectives, and policies either do not arise or are minimized.
2. To consult with each other when developing policy and legislation which affects the attainment of wildlife resource management goals and objectives, or management plans.
3. To recognize that the taking of fish and wildlife by hunting, trapping, or fishing on Service lands in Alaska is authorized in accordance with applicable State and Federal law unless State regulations are found to be incompatible with documented Refuge goals, objectives, or management plans.
4. To develop such supplemental memoranda of understanding between the Commissioner and the Regional Director as may be required to implement the policies contained herein.
5. That this Master Memorandum of Understanding shall become effective when signed by the Commissioner of the Alaska Department of Fish and Game and the Alaska Regional Director of the U.S. Fish and Wildlife Service and shall continue in force until terminated by either party by providing notice in writing 120 days in advance of the intended date of termination.
6. That amendments to this Master Memorandum of Understanding may be proposed by either party and shall become effective upon approval by both parties.

STATE OF ALASKA

Department of Fish
and Game

U.S. DEPARTMENT OF
THE INTERIOR

Fish and Wildlife Service

Ronald O. Skoog
Commissioner

Keith M. Schreiner
Regional Director, Alaska

March 13, 1982
Date

March 13, 1982
Date

APPENDIX I. Consistency Determination for Alaska Coastal Zone Management Policies.

Section 307(c) of the Coastal Zone Management Act of 1972, as amended (PL 92-583), states that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state coastal management programs."

The Alaska Coastal Management Act of 1977, as amended, and the subsequent Alaska Coastal Management Program (ACMP) and Final Environmental Impact Statement of 1979 set forth general policy guidelines and standards to be used for the review of projects. The state's coastal management districts develop more specific policies sections of Alaska's coast. Once approved by the state and the federal government, the district programs become an integral part of the Alaska Coastal Management Program. In the case of Arctic Refuge the North Slope Borough Coastal Management Program went into effect on May 6, 1988.

CONSISTENCY WITH THE ALASKA COASTAL MANAGEMENT PROGRAM (ACMP)

The Arctic Refuge Comprehensive Conservation Plan is a general land use plan that provides broad policy guidance for managing the refuge. The following consistency determination for the Arctic Refuge management alternatives was based on the management directions for each alternative that relate to coastal land and water uses and the environmental effects of each alternative. Specific management actions may require more detailed environmental assessments, and site-specific coastal zone consistency determinations will be prepared at that time.

The Alaska Coastal Management Program identifies 12 primary categories that are to be used in the consistency evaluation. The categories applicable to this plan are as follows:

Coastal development	*
Geophysical hazard areas	*
Recreation	*
Energy facilities	*
Transportation and utilities	*
Mining and mineral processing	*
Subsistence	*
Habitats	*
Air, land and water quality	*
Historic, prehistoric and archaeological resources	*
Fish and seafood processing	
Timber harvest and processing	

*Applicable

The Service has determined the preferred alternative and other proposed alternatives in the final Arctic Refuge Comprehensive Conservation Plan to be consistent with both the North Slope Borough's Coastal Management Program and the Alaska Coastal Management Program. The following table evaluates the consistency of the management alternatives with the requirements of each of the applicable categories noted above.

Alaska Coastal Management Program Section	Policy (condensed from standard)	Evaluation of Preferred and Other Alternatives	Consistency
Coastal Development 6 AAC 80.043	(a) In planning for and developing coastal areas, priority is given to: 1) water-dependent uses and activities 2) water-related uses and activities 3) non-water related or water dependent uses or activities exists.	Little or no development would occur in the refuge's coastal areas in the alternatives. The two primary uses of the coastal areas in all of the alternatives, subsistence and recreation, are both water dependent and water-related uses.	C
	(b) Placement of structures and discharge of dredged or fill material shall comply with Title 33, Code of Federal Regulations, Parts 320-323.	No dredged or fill material would be used in any alternative. No structures would obstruct navigable waters. Alternatives conform to all other requirements of Title 33, Code of Federal Regulations, Parts 320-323.	C
Geophysical Hazard Areas 6 AAC 80.050	Known geophysical hazard areas and areas of high development potential in which there is substantial geophysical hazard will be identified.	The refuge is not within any known geophysical hazard zones.	C
Recreation 6 AAC 80.060	In designating areas for recreation use, priority is given to areas which: 1) receive significant recreational use or are a major tourist destination 2) have potential for high quality recreational use because of physical, biological, or cultural features 3) achieve the high priority of increasing public access	Opportunities for recreational use would be provided consistent with refuge purposes. All of the alternatives provide for increased use of the coastal areas, including commercial guiding and outfitting, although increased management of use eventually may become necessary to limit resource conflicts. Under Alternative G use levels would be limited if existing wilderness values are threatened.	C
Energy Facilities 6 AAC 80.070	The siting and approval of major energy facilities must be based, to the extent feasible and prudent, on 15 standards identified by the state.	Under all of the alternatives the "1002" coastal plain would be designated as a minimal management area, pending congressional action, while the remaining coastal areas are designated wilderness. Thus, until Congress takes action, major energy facilities would not be permitted in the refuge's coastal areas under any of the alternatives.	C
Transportation and Utilities 6 AAC 80.080	(a) Transportation and utility routes must be compatible with district programs. (b) Transportation and utility routes and facilities must be sited inland from beaches and shorelines unless the route or facility is water dependent or no inland alternative exists.	None of the alternatives propose transportation or utility routes on beaches or shorelines. Transportation and utility routes and facilities would not be permitted anywhere in the refuge's coastal areas, except according to the provisions of Title XI of the Alaska Lands Act.	C C

Alaska Coastal Management Program Section	Policy (condensed from standard)	Evaluation of Preferred and Other Alternatives	Consistency
Mining and Mineral Processing 6 AAC 80.110	(a) These uses in the coastal area must be regulated, designed and conducted so as to be compatible with state standards, adjacent uses and activities, statewide and national needs, and district programs. (b) Sand and gravel may be extracted from coastal waters when there is no feasible and prudent alternative to coastal extraction which will meet the public need for the sand and gravel.	There are no known active or valid mining claims within the refuge's coastal areas. Section 304(c) of the Alaska Lands Act closed the refuge to prospecting, development, extraction, and removal of locatable hardrock minerals. Thus, under all of the alternatives mining and mineral processing would not be permitted in the refuge's coastal areas. Sand and gravel extraction would not be permitted on refuge lands in coastal areas pending congressional action, under any of the alternatives. ^{1/} Other alternative sites would be sought before sand and gravel extraction would be considered on refuge lands in the coastal areas.	C C
Subsistence 6 AAC 80.120	Opportunities for subsistence use of coastal areas and resources shall be recognized and assured. Before a potentially conflicting use or activity may be authorized in subsistence zones, a study of the possible adverse impacts upon subsistence use must be prepared and safeguards provided to assure subsistence use.	Providing for subsistence use is one of the primary purposes for which the refuge was established and shall be managed. All of the alternatives would maintain subsistence use opportunities in the refuge's coastal areas. Section 810(a) evaluations are included in this plan. Additional detailed Section 810(a) evaluations would be prepared as appropriate for specific management actions.	C
Habitats 6 AAC 80.140	The habitats identified in this section must be managed so as to maintain or enhance the biological, physical, and chemical characteristics of the habitat which contribute to its capacity to support living resources.	Conservation of fish and wildlife habitats is one of the primary purposes for which the refuge was established and shall be managed. The management directions in all of the alternatives would maintain the integrity and biological health of coastal habitats. The Service would monitor the coastal habitats, consult with the state, and manage public use levels to avoid potential impacts to coastal habitats.	C
Air, Land and Water Quality 6 AAC 80.140	Regulations and procedures of the Alaska Department of Environmental Conservation pertaining to the protection of air, land, and water quality are components of the Alaska Coastal Management Program.	All standards will be met by the alternatives. The Service will cooperate with the state in enforcing air and water quality standards. No developments or uses would be permitted under any of the alternatives, pending congressional action, that would significantly affect air, land, and water quality in the refuge's coastal areas.	C
Historic, Prehistoric and Archeological Resources 6 AAC 80.150	Areas of the coast which are important to the study, understanding or illustration of national, state, or local history or pre-history will be identified.	In all alternatives all identified significant historic and cultural resources would be protected as required under federal law.	C

^{1/}On the Kaktovik Inupiat Corporation-Arctic Slope Regional Corporation lands sand and gravel extraction related to oil and gas activities would be permitted, subject to the stipulations included in the Chandler Lake land exchange agreement.

APPENDIX J. International Treaties.

A number of international treaties affect how the Fish and Wildlife Service manages Arctic National Wildlife Refuge. The following table identifies the major treaties and the primary purposes of these treaties.

TREATY

PURPOSE

Convention between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment

To provide for the protection of species of birds which are common to both countries, or which migrate between them by (1) enhancement of habitat, (2) exchange of research data, and (3) regulation of hunting.

Convention between the United States and Great Britain (for Canada) for the Protection of Migratory Birds

Adopted a uniform system of protection for certain species of birds which migrate between the United States and Canada, to assure the preservation of species either harmless or beneficial to man. The Migratory Bird Treaty Act, which implemented the statute, set dates for closed seasons on migratory birds, prohibits hunting of insectivorous birds, but allows control of birds under permit when injurious to agriculture. Canada and the U.S. signed an agreement to amend the treaty to allow subsistence hunting of waterfowl outside of the normal hunting season.

Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment

Provides for the protection of species of birds that migrate between the United States and the Soviet Union or that occur in either country and "have common flyways, breeding, wintering or moulting areas." Encourages actions to identify and protect important habitat and to cooperate in measures to protect migratory birds identified as being in danger of extinction.

Treaty between the United States and Great Britain Relating to Boundary Waters between the United States and Canada

To prevent disputes regarding the use of boundary waters and settle all questions pending or that may arise in the future between the United States and Canada involving the rights, obligations and interests of both nations along their common frontier.

Treaty of Washington between the United States and Great Britain (dated May 8, 1871)

Guarantees the navigational use of the Yukon and Porcupine rivers by Canada. Includes protection of the free passage of fish which spawn in Canada.

TREATY

PURPOSE

Convention between the United States and the United Mexican States for the Protection of Migratory Birds and Game Mammals

Adopted a system for protecting certain migratory birds in the United States and Mexico. Allows, under regulation, the rational use of certain migratory birds. Provides for enactment of laws and regulations to protect birds by establishment of closed seasons and refuge zones. Prohibits killing of insectivorous birds, except under permit when harmful to agriculture. Provides for enactment of regulations on transportation of game mammals across the United States-Mexican border.

The Pacific Salmon Treaty between the United States and Canada

Establishes six fishery management regions, as well as a Pacific Salmon Commission charged with managing the Pacific salmon fishery on the west coast of the U.S. Major provisions of the treaty include joint management of the Pacific salmon stocks and a reduction in catch of certain stocks off southeastern Alaska and British Columbia. It also provides for U.S.-Canadian negotiations on Yukon River stocks of Pacific salmon with management based on escapement needs.

Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (United States and 17 other American Republics)

To "protect and preserve in their natural habitat representatives of all species and genera of their native flora and fauna, including migratory birds" and to protect regions and natural objects of scientific value. The nations agreed to take certain actions to achieve these objectives, including the adoption of "appropriate measures for the protection of migratory birds of economic or esthetic value or to prevent the threatened extinction of any given species."

Agreement on Cooperation in the Field of Environmental Protection (United States and the Union of Soviet Socialist Republics)

To cooperate in the field of environmental protection through exchange of scientific personnel, organization of bilateral conferences, exchange of scientific and technical information, and development and implementation of projects. Emphasizes activities related to air and water pollution, enhancement of urban environments, preservation of nature, establishment of preserves, and arctic and subarctic ecological systems.

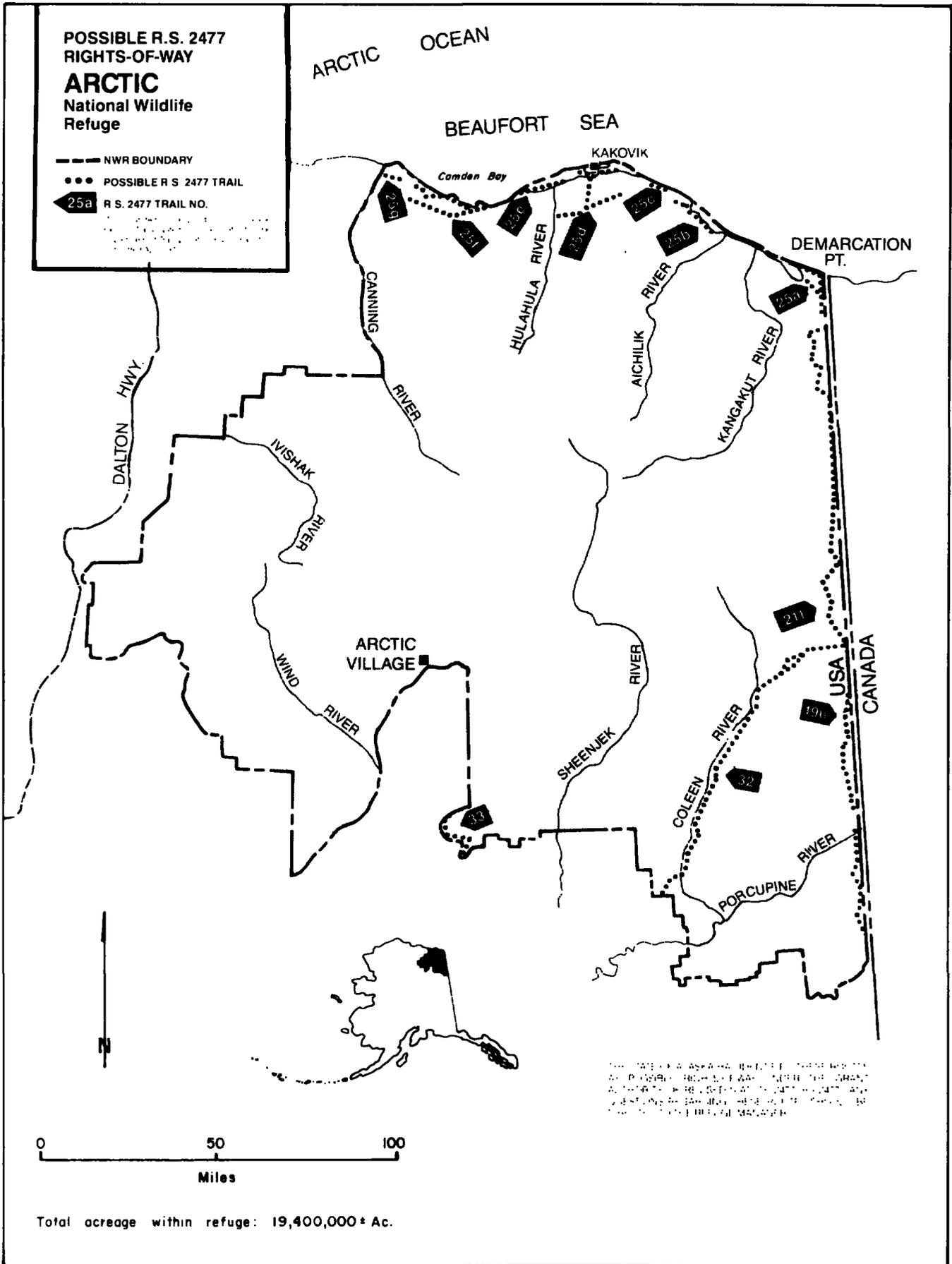
TREATY

Agreement on the Conservation
of Polar Bears

PURPOSE

This agreement between the governments of Canada, Denmark, Norway, USSR, and the U.S. recognizes the responsibilities of the circumpolar countries for coordination of actions to protect polar bears. The agreement commits the signatories to manage polar bear populations in accordance with sound conservation practices; prohibits hunting, killing, and capturing bears except for limited purposes and by limited methods; and commits all parties to protect the ecosystems of polar bears, especially denning and feeding areas and migration corridors.

APPENDIX K. Possible RS 2477 Rights-of-Way in Arctic Refuge.



APPENDIX L.

**UNITED STATES
DEPARTMENT OF THE INTERIOR**

**ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA,
COASTAL PLAIN RESOURCE ASSESSMENT**

APRIL 1987

**Recommendation of the Secretary of the Interior
to
The Congress of the United States**



**In accordance with Section 1002 of the
Alaska National Interest Lands Conservation Act**

SECRETARY'S RECOMMENDATION

INTRODUCTION

The Arctic National Wildlife Refuge in Northeastern Alaska is a 19-million-acre unit of the National Wildlife Refuge System. Section 1002(h) of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980 directed the Secretary of the Interior to:

- o conduct biological and geological studies of the 1.5-million-acre coastal plain portion of the Arctic Refuge (the "1002 area");
- o report the results of those studies to the Congress; and
- o recommend to the Congress whether the 1002 area should be made available for oil and gas exploration and development.

During Congressional deliberations in 1977-80 about management of lands in Alaska, the Congress expressed particular interest in the possibility of significant oil and gas deposits in the 1002 area and in the effect of development of such resources on the area's fish, wildlife, and wilderness resources. The Congress set forth a deliberate process for the Department of the Interior to study, analyze and report on all of these resources and to provide a recommendation on future management of the 1002 area.

DISCUSSION

1002 Area Oil and Gas Resources

The 1002 area is the Nation's best single opportunity to increase significantly domestic oil production over the next 40 years. It is rated by geologists as the most

outstanding petroleum exploration target in the onshore United States. Data from nearby wells in the Prudhoe Bay area and in the Canadian Beaufort Sea and Mackenzie Delta, combined with promising seismic data gathered on the 1002 area, indicate extensions of producing trends and other geologic conditions exceptionally favorable for discovery of one or more supergiant fields (larger than 500 million barrels).

The area could contain potentially recoverable oil resources of more than 9.2 billion barrels, an amount nearly equal to the Prudhoe Bay oil field, which currently provides almost one-fifth of U.S. domestic production. If this estimate proves to be correct, development of the 1002 area resources would add significantly to domestic reserves.

Production from the 1002 area could begin at a time when a decline in production is expected at Prudhoe Bay. Alaska North Slope crude oil production, mostly from Prudhoe Bay, currently averages 1.8 million barrels per day. But, Prudhoe Bay production is expected to peak this year and decline to 680,000 barrels per day in the year 2000, and to 250,000 barrels per day in 2010. Production of the 1002 area's potential resources could substantially offset this significant and certain decline.

The proximity of the 1002 area to Prudhoe Bay and the Trans-Alaska Pipeline System also is an important factor. Prudhoe Bay provides a fully developed staging area to support exploration and development activities in the 1002 area. Technologies employed at Prudhoe Bay are readily applicable for the 1002 area. The Trans-Alaska Pipeline System provides a ready means for bringing 1002 area oil to U.S. markets. In addition, transportation of 1002 area oil likely would prolong the useful life of the pipeline system and permit continued production from North Slope fields which otherwise would be uneconomical.

Based on the mean conditional recoverable oil estimate of 3.2 billion barrels, 1002 area production by the year 2005 could provide 4 percent of total U.S. demand; provide 8 percent of U.S. production (about 660,000 barrels per day); and reduce imports by nearly 9 percent (table below). This production could provide net national economic benefits of \$79.4 billion, including Federal revenues of \$38.0 billion.

Discovery of 9.2 billion barrels of oil could yield production of more than 1.5 million barrels per day. Estimates of net national economic benefits based on 9.2 billion barrels of oil production, and other economic assumptions, are as high as \$325 billion.

The 1002 area's potential contribution to U.S. oil demand, production, and imports.

[In thousands of barrels per day. U.S. demand, production, and import data from U.S. Department of Energy, 1985, table 3-10.]

Year.....	2000	2005	2010
<hr/>			
U.S. OIL DEMAND ¹	16,400	16,000	15,900
<hr/>			
1002 AREA OIL PRODUCTION			
Full leasing.....	147	659	404
Percent of U.S. total demand9	4.0	2.5
<hr/>			
U.S. OIL PRODUCTION ²	9,000	8,400	7,600
<hr/>			
1002 AREA OIL PRODUCTION			
Full leasing.....	147	659	404
Percent of U.S. total production	1.6	7.9	5.3
<hr/>			
U.S. OIL IMPORTS (net)	7,400	7,600	8,300
<hr/>			
1002 AREA OIL PRODUCTION			
Full leasing.....	147	659	404
Percent of U.S. total imports.....	2.0	8.7	4.9
<hr/>			

¹Excludes refinery gains.

²Includes natural gas liquids, enhanced oil recovery, and shale oil. Figures for 1002 area production not included in DOE data.

Oil production from the 1002 area would reduce not only the need for imported oil but also the amount of foreign exchange required to pay for petroleum imports, thereby bringing about a more favorable balance of trade. In 1984, the gross cost of importing crude oil and refined petroleum products was more than \$59 billion, an amount approximately equal to 50 percent of the U.S. trade deficit. The cost of imports in 1986 was \$28 billion as a result of lower oil prices. However, the Department of Energy has predicted that by 1995, oil imports may cost the equivalent of \$80 billion.

Production from the 1002 area also would reduce U.S. vulnerability to disruptions in the world oil market and contribute to our national security, particularly in light of the following trends highlighted in the March 1987 Department of Energy report to the President on Energy Security:

- o U.S. oil reserves and production capacity are declining and are expected to decline further over the next decade. The domestic production rate fell about 800,000 barrels per day (9-10 percent drop) in 1986 and is expected to decline an additional 400,000 barrels per day (drop of 4-5 percent more) in 1987. Clearly, should prices continue to fall, production will drop further.
- o U.S. oil consumption, which has exceeded U.S. production since the 1960's, is expected to increase.
- o U.S. oil imports increased almost 1 million barrels per day, to an average of 5.3 million barrels per day for 1986. Between 1990 and 1995, imports are projected to increase to 50 percent of consumption, reaching 8 million to 10 million barrels per day.
- o Persian Gulf countries are expected to supply 30-45 percent of the world's oil by 1995, at which time all OPEC countries combined are projected to provide 45-60 percent of world oil supplies.
- o Reduced U.S. oil exploration and production will increase U.S. reliance on oil from the unstable Persian Gulf region.

America's growing reliance on imported oil for the rest of the century could have potentially serious implications for our national security.

The economic and political consequences of such trends are adverse to U.S. interests. Because the 1002 area is the best domestic opportunity to help reverse or reduce the decline in U.S. oil reserves and production, the public interest demands that the area be made available for oil and gas exploration and development, conducted in an orderly and sensitive manner to avoid unnecessary adverse effects on the environment.

Environmental Consequences of Development

The 1002 area provides a variety of outstanding arctic habitats which support fish and wildlife species of national and international significance, including muskoxen (reintroduced), snow geese, and the Porcupine caribou herd--the sixth largest caribou herd in North America.

More than 50 separate biological studies conducted in the 1002 area since 1980 have been documented in a series of biological baseline studies. These data have been synthesized in the final report and legislative environmental impact statement (final report/LEIS) and used to provide the best assessment of the potential environmental consequences of oil development in the 1002 area.

Potential impacts were assessed at three stages of oil activity: exploration, development drilling, and production. The impact analyses predicted that exploration and development drilling activities would generate only minor or negligible effects on all wildlife resources on the 1002 area. Therefore, the focus of potential impacts is on production and assumes the discovery of 3.2 billion barrels of producible oil (mean conditional recoverable estimate). The impact analyses concluded that in fact more than 9.2 billion barrels could be produced with no significant additional environmental impacts than would result from production of 3.2 billion barrels.

Production of billions of barrels of oil is expected to directly affect only 12,650 acres or 0.8 percent of the 1002 area. The consequences of this level of production on important species such as brown bears, snow geese, wolves, and moose, as well as the Central Arctic caribou herd, are expected to be negligible, minor, or moderate.

The only potential "major" effects are attendant to oil production and are limited to the Porcupine caribou herd and the reintroduced muskox herd. "Major biological effects," for purposes of the analysis, were defined as: "widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of species. Modification will persist at least as long as modifying influences exist." Therefore, "major" is not synonymous with adverse. Either of two conditions, change in species distribution or population dynamics, would result in a rating of "major."

PORCUPINE AND CENTRAL ARCTIC CARIBOU HERDS

Although comparing the effects of Prudhoe Bay development on the Central Arctic caribou herd with the potential effects of similar activities in the 1002 area on the Porcupine caribou herd must be done with caution, experiences at Prudhoe Bay provide a strong measure of assurance that caribou can coexist successfully with oil development.

Substantial empirical evidence has been gathered over the years regarding the interaction of the Central Arctic herd with the Prudhoe Bay complex. Although that herd has had a considerable portion of its range, including calving areas, occupied by oil-production facilities, the herd has prospered and, in fact, tripled in size since oil activities began in the area in 1968.

The fact that billions of barrels of oil have been produced and transported from Prudhoe Bay while the area's fish and wildlife resources continue to thrive indicates that effective environmental techniques and technologies are available for use in the 1002 area, a short distance to the east.

Biological studies have found that the Porcupine caribou herd calves in different areas each year--throughout the 1002 area, elsewhere in the Arctic Refuge, and in Canada--on an area totaling approximately 8.9 million acres. Moreover, the Porcupine caribou herd is present in the 1002 area for calving, postcalving, and insect-relief activities only 6 to 8 weeks annually, primarily from mid-May to mid-July.

The Porcupine caribou herd has shown some preference for calving on the Arctic Refuge coastal plain, including the upper Jago River area (84,000 acres or 5.4 percent of the 1002 area) where portions of the herd have calved in approximately half of the last 15 years. Thus, a potential "major" consequence would be the displacement of those portions of the herd seeking to calve in the upper Jago River area. This would be the case only if the area were the site of a major producing oil field. It is unlikely, though possible, that such displacement would result in any appreciable decline in herd size.

It is important to note that this issue of displacement is a primary matter of concern regarding the Porcupine caribou herd. Although it is not known whether development, including roads and oil pipelines, could affect the migratory habits of the herd, it already encounters the Dempster Highway in Canada during its annual migrations and crosses the road with no measured adverse effects. Similarly, other caribou herds in Alaska and Canada (i.e., Nelchina, Fortymile, and Central Arctic) routinely cross highway and road systems. Both the Central Arctic and Nelchina herds also routinely cross the Trans-Alaska Pipeline with no adverse effects. This pattern of successful interaction with roads and pipelines during migration is expected for the Porcupine caribou herd.

In addition, the Porcupine caribou herd should not be affected adversely during the short-term period (6 to 10 days) that they use 1002 area habitats for insect relief following calving. The ability of the herd to move to insect-relief areas along the coast is unlikely to be significantly affected by pipeline/road corridors crossing the 1002 area.

Furthermore, the long period of time required to bring commercial fields into production would provide ample opportunity to develop any additional mitigation measures as may be needed to address unexpected impacts.

Biological predictions necessarily are cautious. In the 1972 environmental evaluation for the Trans-Alaska Pipeline System, the following possible effects on the Central Arctic herd were predicted: "The combined barrier effects of the highway and pipeline might very well reduce the number of animals using the winter range east of the highway." As events have demonstrated, however, these concerns subsequently were resolved completely with environmentally sensitive techniques and technologies. Biological predictions in the final report/LEIS for the 1002 area naturally are cautious as well.

MUSKOXEN

Muskoxen disappeared from the 1002 area at the turn of the century. Those that now occupy the area are the result of a successful reintroduction program. The potential effects of oil and gas activities on the area's muskoxen also are unknown, although biologists predict that "major" effects could be: (1) substantial displacement from currently used habitat and (2) a slowing of the herd's growth rate, as distinguished from a diminution in herd size.

Environmental Safeguards and the Leasing Process

The potential effects predicted above have been considered fully throughout the final report/LEIS and in the development of my recommendations. I also have recognized that site-specific measures can be taken to avoid unnecessary adverse effects on the environment from oil production in the 1002 area.

The step-by-step environmental planning, review, and evaluation procedures included in a leasing program provide the best opportunity for the Department of the Interior to make decisions based on the most accurate and advanced information available at each step of the process.

The following steps might be included in such a leasing program, although the exact process would depend upon the leasing program established by the Congress:

- o Compliance with the National Environmental Policy Act (NEPA) for each lease sale. Lease stipulations and mitigation measures are identified at this stage and are in effect for the entire term of the specified lease.
- o Compliance with NEPA for each exploration plan.

- o Compliance by each operator/lessee, or the Department of the Interior, as appropriate with such laws as NEPA, the Clean Air Act, Clean Water Act, Endangered Species Act, National Historic Preservation Act, and ANILCA. The lease also would be governed by Departmental regulations.
- o Compliance with NEPA for each operator/lessee development and production plan.

SECRETARY'S RECOMMENDATION

I recommend that the Congress direct the Secretary of the Interior (Secretary) to conduct an orderly oil and gas leasing program for the entire 1.5-million-acre 1002 area at such pace and in such circumstances as he determines will avoid unnecessary adverse effects on the environment.

- o The Secretary should be given authority to establish requirements for oil and gas operations that allow them to proceed in an economically reasonable manner but avoid unnecessary adverse effects on the 1002 area's wildlife, habitat, and environment.
- o Competitive leasing authority should be granted to the Secretary to delegate as he believes proper, and should be similar to that used to lease the National Petroleum Reserve in Alaska. The Secretary should also have authority to decide such issues as unitization, drainage, diligence, and lease terms and management.
- o The Secretary should be granted authority to suspend or terminate any leases in the 1002 area at any time, in the same manner prescribed by the Outer Continental Shelf Lands Act as amended. If leases are terminated for reasons beyond the control of the operators/lessees, operators/lessees should be compensated in a manner similar to that prescribed by the Outer Continental Shelf Lands Act as amended.
- o The Secretary should have the authority to require lessees to restore the leased tract to protect environmental values to the extent reasonably possible and desirable.
- o The Secretary should be granted authority, which supersedes ANILCA Title XI, to grant rights-of-way and easements across 1002 area lands for oil- and gas-related activities and facilities. This authority must allow the Secretary to require siting and modifications of proposed facilities to avoid unnecessary duplication of roads and pipelines.
- o All geological and geophysical data acquired with respect to the 1002 area should be shared, upon request, with the Secretary who should ensure its confidentiality.

In light of the extensive environmental analysis done to prepare the final report/LEIS, I recommend that it be adopted statutorily as the programmatic EIS for a leasing program for the 1002 area.

Because Section 1002(i) of ANILCA withdrew the 1002 area from operation of the mineral leasing laws, and Section 1003 prohibited "leasing or other development leading to the production of oil and gas" in the area "until authorized by an Act of Congress," specific legislation must be enacted to implement my recommendations.

In recommending that Congress enact legislation to open the 1002 area for oil and gas leasing, I also recommend that Congress enact legislation to open the Kaktovik Inupiat Corporation (KIC)/Arctic Slope Regional Corporation (ASRC) lands within the Arctic Refuge to similar activities.

The ASRC's right to develop and produce any oil and gas which may underlie the KIC/ASRC lands within the Arctic Refuge is, by virtue of the 1983 Chandler Lake Exchange Agreement, expressly contingent upon Congressional authorization of oil and gas leasing or development and production within the 1002 area, or on the KIC/ASRC lands specifically.¹

Selection Of Preferred Alternative (Alternative A)

I have selected Alternative A Full Leasing, as my preferred alternative for management of the 1002 area, after evaluating carefully the five alternatives in Chapter V of the final report/LEIS, pursuant to the requirements of the National Environmental Policy Act. I believe that Alternative A best meets the Nation's goals and responsibilities.

Before selecting this alternative, I considered the information presented in the final report/LEIS, the draft recommendation of the Assistant Secretary for Fish and Wildlife and Parks, comments and information received during the public-comment period, and consultations with the Government of Canada.

¹KIC selected and received conveyance of surface estate in these lands pursuant to the Alaska Native Claims Settlement Act (ANCSA) and ANILCA. In passing ANILCA, Congress gave ASRC the option of acquiring subsurface estate in these lands if, in the future, it opened the 1002 area to commercial oil and gas development. By entering into the Chandler Lake Agreement pursuant to ANILCA and ANCSA, the Department of the Interior in effect allowed ASRC to accelerate exercising this option in return for conveying to the Federal government valuable ASRC park inholdings the Department would not have obtained otherwise. ASRC also agreed that development and production of oil and gas on the Arctic Refuge lands would be contingent upon a subsequent act of the Congress.

I have considered the 1002 area's unique opportunity to provide potentially enormous quantities of domestic oil, in light of America's increasing dependence on imports. Oil production from the 1002 area could begin at a time when America's largest producing field, Prudhoe Bay, will be diminishing. I also have considered the potential \$79 billion to \$325 billion contribution to the Nation's economy from development of the 1002 area's estimated oil resources, as well as the favorable effects on our balance of trade and national security.

In addition, I evaluated the potential effects of developing these potential hydrocarbon resources on the wilderness, wildlife, and subsistence values of the coastal plain. Many commenters indicated the need and desire to conserve the significant environmental values of the 1002 area. Public comment also overwhelmingly supported opening the area for oil and gas development. My recommendation reflects my firm belief, based on demonstrated success at Prudhoe Bay and elsewhere, that oil and gas activities can be conducted in the 1002 area in a manner consistent with the need and desire to conserve the area's significant environmental values.

Our ability to conduct oil exploration, development, and production in a careful and environmentally sound manner is a factor leading me to designate Alternative A as the environmentally preferred alternative. This conclusion is based on the environmental impacts of substitute sources of energy. The Department of the Interior's analysis of these impacts, described in Chapter VI of the final report/LEIS, concludes that each of the available substitute possibilities involves a large measure of environmental harm. Also, in the event of a future energy crisis, there would be strong pressure to develop rapidly, promising areas like the 1002 area, without regard for environmental factors.

Alternative E--Wilderness Designation

Several commenters supported Alternative E, which calls for designation of the 1002 area as wilderness² pursuant to the 1964 Wilderness Act and ANILCA. I am persuaded that such designation is not necessary to protect the 1002 area environment and is not in the best interest of the Nation.

²The Wilderness Act provides that "there shall be no commercial enterprise and no permanent road within any wilderness area and, except as necessary to meet minimum requirements for the administration of the area * * * there shall be no temporary roads, no use of motor vehicles, motorized equipment, or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area" 16 U.S.C. 113(c). Congress has recognized some special uses allowable in Alaskan wilderness areas which are described in Chapter V of the final report/LEIS.

A criterion used in determining whether certain lands should be designated wilderness is uniqueness. In Alaska, there are approximately 55 million acres of Federal land set aside by statute as wilderness and another 80 million acres managed as national parks, preserves, wildlife refuges, wild and scenic rivers, and conservation or recreation areas. In addition, there are millions of acres in Alaska which constitute nonstatutory wilderness. Moreover, the 1.5-million-acre 1002 area (about 8 percent of the Arctic Refuge) is bordered to the south and east by more than 8 million acres of designated wilderness. (For reference, 8 million acres is equal to the combined size of the States of Connecticut and Massachusetts; 55 million acres is equal to the combined acreage of the six New England States, Delaware, Maryland, and New Jersey.) To the east of the 1002 area is Canada's 3-million-acre Northern Yukon National Park.

Given the existence of extensive lands set aside for wilderness and other preservation purposes in this area and in Alaska, the 1002 area's value as statutory wilderness is not unique.

On the other hand, the enormous oil potential of the 1002 area, believed to be America's last onshore area with such potential, provides a unique opportunity to contribute to the Nation's energy, economic, and national security. Because environmentally sensitive management techniques and technologies are available and can be employed to protect the important fish and wildlife values of the coastal plain, we need not forgo the opportunity to develop the 1002 area's potential energy resources.

The fish and wildlife species that might be affected by oil and gas activities in the 1002 area are very important but are neither threatened nor endangered. In fact, they are relatively abundant in Alaska and North America. As noted earlier, the Porcupine caribou herd is the sixth largest caribou herd in North America. The muskox reintroduction effort has been so successful that some hunting is now permitted. Once again, the potential effects of oil production on other wildlife values are expected to be moderate to negligible. Constant monitoring of oil activities is likely to ensure that this continues to be the case. Most effects of any development would disappear with time, once activities cease and reclamation requirements are fulfilled.

With regard to subsistence, potential effects of 1002 area oil production fall into two categories: effects on the village of Kaktovik and effects on villages far removed from the 1002 area. In the case of Kaktovik, it is possible that a "major" restriction of subsistence activities could occur. These consequences would not likely result from reduced wildlife resources but rather could result from the physical changes proximate to Kaktovik which could interfere with traditional activities. Moreover, distribution patterns of wildlife resources likely to be affected by oil production would necessitate some alterations in traditional subsistence patterns.

The Department of the Interior is committed to working with the village of Kaktovik, the North Slope Borough, and the State of Alaska to minimize the effects of oil activities on the subsistence activities of Kaktovik residents.

Subsistence effects on villages outside the 1002 area, including those in Canada, are expected to be minimal. Because it is most probable that oil activities will not create adverse population changes in the Porcupine caribou herd, other villages which annually use these caribou resources should not be affected. Migratory patterns of the herd also are likely to be unaffected by oil activities. Accordingly, the herd is expected to adhere to its traditional patterns which make it available annually to these villages.

I recognize the importance of ensuring the continued customary and traditional use of this internationally shared resource. I am committed to efforts that will conserve the Porcupine caribou herd for future generations of people who rely on this resource for nutritional, cultural, and other essential needs. The Porcupine caribou agreement we are pursuing with Canada will enhance international cooperation and coordination on management of the Porcupine caribou herd so that both countries can effectively secure the availability of this resource.

Some proponents of Alternative E have suggested that the 1-in-5 probability of finding economically recoverable oil resources in the 1002 area does not outweigh the potential environmental risks.

First, the chances of finding oil in the 1002 area are rated by geologists to be excellent compared to other frontier regions. Second, biological assessments have concluded that exploratory drilling following leasing would have minor or negligible environmental effects. Finally, if no oil is discovered, effects on the 1002 area environment would be negligible and the area would not likely be an exploration target in the event of future oil-supply disruptions.

Alternative D—No Action

For many of the reasons described above, Alternative D, No Action, is also not the preferable choice.

Authority to lease the 1002 area is needed now in order to determine whether economically recoverable reserves exist and to produce those resources for America's future. Even if exploration resulted in commercial finds today, it could be as long as 10 to 15 years before those resources would be brought into production. If we delay, our inaction would serve to blindfold America to its ability to increase domestic production. It also would send a dangerous signal to the world oil market that America is not willing to help itself avoid increased dependence on the Middle East's substantial concentration of world oil supply.

Alternative C--Further Exploration

Alternative C, which would provide for further exploration before the Congress enacts leasing authority, was rejected for several reasons.

Without authorization for a leasing program, the private sector cannot be expected to invest financial resources in exploring the 1002 area. Incentive for additional exploration can be provided only by expected returns if commercially producible oil is discovered. This incentive exists only when leases can be acquired and subsequently developed.

Lacking proper economic incentives, Alternative C could necessitate a Federal exploration program for the 1002 area. Such an approach has serious disadvantages. A federally funded exploration program would require substantial outlays at a time of severe Federal budget constraint. Moreover, history shows that it is unlikely that the Federal government could conduct an effective and timely exploration program. Government agencies are not geared to make large, high-risk investment decisions. The Federal government has been harshly criticized for its lack of success in managing a federal exploration program for the National Petroleum Reserve in Alaska.

Alternative B--Limited Leasing

Alternative B would limit the amount of the 1002 area available for exploration and development by excluding the upper Jago River area. This alternative would lower the oil resource estimate for the 1002 area by 25 percent and reduce the mean expected net national economic benefits by about 30 percent.

The primary difference in environmental concerns between Alternatives A and B is the unlikely but potential risk to the Porcupine caribou herd from oil production activities in the upper Jago River area.

Such activities are likely to displace portions of the Porcupine caribou herd from that area, but it is probable that such displacement would take place without consequential adverse population effects. The mere presence of such a risk makes no compelling case for forgoing the potential for billions of barrels of oil and the attendant national economic and energy security benefits. In addition, as noted earlier, the long period of time required to bring oil into production provides ample opportunity to develop any additional mitigation measures as may be necessary to address unexpected impacts.

Given the proven record that potential environmental effects of oil production can be avoided substantially, and given America's need for additional domestic energy resources, it is essential that the Congress enact legislation to authorize the Secretary of the Interior to conduct an orderly oil and gas leasing program for the entire 1002 area.

CONSULTATIONS WITH CANADA

In conducting biological studies for the 1002 area related to the Porcupine caribou herd, the U.S. Fish and Wildlife Service worked closely with biologists from the State of Alaska and the Canadian Wildlife Service. The Canadian Wildlife Service and its Yukon Wildlife Branch conducted independent studies of the Porcupine caribou herd during 1978-81 relative to potential oil and gas development in Canada's Yukon and Northwest Territories. Prior to assessing potential environmental consequences of oil and gas development in the 1002 area, the Fish and Wildlife Service conducted a Caribou Impact Analysis Workshop in which Canadian biologists participated at our invitation.

In addition to these technical consultations, representatives of the Fish and Wildlife Service and Canadian Wildlife Service for the past several years have been negotiating a separate Porcupine caribou herd agreement. The final draft agreement, now being reviewed by the Department of the Interior, calls for both countries to take appropriate steps to ensure international cooperation and coordination of actions that might affect the Porcupine caribou herd in order to conserve the species and its habitat. The agreement would establish an advisory board to make recommendations and provide advice to each government to assist in this management effort. Such an agreement will enhance the consultative mechanisms between Canada and the United States on future activities that may be conducted on either side of the border.

When the draft 1002(h) report was made available to the Congress and public for review in November 1986, the Department of the Interior's Assistant Secretary for Fish and Wildlife and Parks also invited the Government of Canada to comment on the draft. To date, three consultation sessions have been held, two in Ottawa and one in Washington, D.C. These sessions provided both countries the opportunity to discuss the biological and geological data upon which this final report/LEIS is based and to address the assessment of impacts on the Porcupine caribou herd and other wildlife resources by possible development activities. Consultations will continue upon request by either country, and the Department of the Interior looks forward to future opportunities to discuss with Canada resource issues of mutual concern.

CONCLUSION

The Secretary of the Interior should seek both to protect the Nation's wildlife resources and to enhance America's ability to meet its energy needs with domestic energy resources on Federal lands. For the Arctic National Wildlife Refuge coastal plain, these goals affect not only the State of Alaska but also all 240 million American citizens to whom the 1002 area belongs.

This Nation has proven that it need not choose between an improving environment on the one hand, and exploration and development of the energy resources required for growth and survival on the other. We can have both. It is my firm belief that an orderly oil and gas leasing program for the entire 1002 area can be conducted in concert with America's environmental goals.

APPENDIX M. Description of the Ivishak, Upper Sheenjek, and Wind National Wild River Corridors.

Legal Description of the Ivishak Wild River Corridor

T. 10S., R. 23E.; UM

Sec. 1, SW 1/4
Sec. 2-11, ALL
Sec. 12, W 1/2
Sec. 13, NW 1/4
Sec. 14, N 1/2
Sec. 17, NW 1/4
Sec. 18, ALL
Sec. 19, NW 1/4

T. 9S., R. 23E.; UM

Sec. 1, SW 1/4
Sec. 2-12, ALL
Sec. 14, W 1/2
Sec. 15-22, ALL
Sec. 23, W 1/2
Sec. 26, W 1/2, SE 1/4
Sec. 27-35, ALL
Sec. 36, W 1/2

T. 9S., R. 21E.; UM

Sec. 1-3, ALL
Sec. 8, SE 1/4
Sec. 9, E 1/2, SW 1/4
Sec. 10-17, ALL
Sec. 18, SE 1/4
Sec. 19, NE 1/4
Sec. 20-29, ALL
Sec. 31, SE 1/4
Sec. 32-36, ALL

T. 8S., R. 22E.; UM

Sec. 1, ALL
Sec. 2, E 1/2, SW 1/4
Sec. 11-16, ALL
Sec. 17, S 1/2
Sec. 19, SE 1/4
Sec. 20-36, ALL

T. 10S., R. 22E.; UM

Sec. 1-2, ALL
Sec. 22 and 23, N 1/2
Sec. 24, ALL
Sec. 29, NW 1/4
Sec. 30, N 1/2

T. 10S., R. 21E.; UM

Sec. 1-5, ALL
Sec. 6 and 7, E 1/2
Sec. 8-18, ALL
Sec. 20 and 21, N 1/2
Sec. 23, N 1/2
Sec. 24, ALL

T. 9S., R. 22E.; UM

Entire township

T. 8S., R. 24E.; UM

Sec. 3, W 1/2
Sec. 4-7, ALL
Sec. 8, NW 1/4

T. 8S., R. 23E.; UM

Sec. 1-6, ALL
Sec. 7, N 1/2, SW 1/4
Sec. 8-11, N 1/2
Sec. 12, E 1/2, NW 1/4
Sec. 19, S 1/2
Sec. 20, SW 1/4
Sec. 29, W 1/2
Sec. 30-32, ALL
Sec. 33, S 1/2

T. 8S., R. 21E.; UM

Sec. 25, E 1/2, SW 1/4
Sec. 26, S 1/2
Sec. 32, E 1/2
Sec. 33-36, ALL

T. 7S., R. 23E.; UM

Sec. 29, W 1/2
Sec. 30 and 31, ALL
Sec. 32, W 1/2, SE 1/4
Sec. 33-36, S 1/2

T. 6S., R. 22E.; UM

Sec. 19, ALL
Sec. 20, SW 1/4
Sec. 27, SW 1/4
Sec. 28, W 1/2, SE 1/4
Sec. 29-34, ALL
Sec. 35, W 1/2, SE 1/4

T. 6S., R. 20E.; UM

Sec. 1, ALL
Sec. 12, NE 1/4

T. 5S., R. 21E.; UM

Sec. 18, SW 1/4
Sec. 19, ALL
Sec. 30-32, ALL
Sec. 33, W 1/2, SE 1/4
Sec. 34, SW 1/4

T. 5S., R. 19E.; UM

Sec. 1-9, ALL
Sec. 10-12, N 1/2

T. 5S., R. 18E.; UM

Sec. 1-4, ALL
Sec. 5, NE 1/4
Sec. 9, NE 1/4
Sec. 10, E 1/2, NW 1/4
Sec. 11 and 12, ALL

T. 7S., R. 24E.; UM

Sec. 28 and 29, S 1/2
Sec. 30, SE 1/4
Sec. 31-33, ALL
Sec. 34, W 1/2

T. 7S., R. 22E.; UM

Sec. 1, W 1/2, SE 1/4
Sec. 2-4, ALL
Sec. 5, E 1/2, NW 1/4
Sec. 6, N 1/2
Sec. 9, NE 1/4
Sec. 10, E 1/2, NW 1/4
Sec. 11-13, ALL
Sec. 14, E 1/2, NW 1/4
Sec. 23, E 1/2
Sec. 24 and 25, ALL
Sec. 36, ALL

T. 6S., R. 21E.; UM

Sec. 2, SW 1/4
Sec. 3-6, ALL
Sec. 7, E 1/2, NW 1/4
Sec. 8-11, ALL
Sec. 12, SW 1/4
Sec. 13, W 1/2, SE 1/4
Sec. 14 and 15, ALL
Sec. 16, E 1/2, NW 1/4
Sec. 22-25, ALL
Sec. 26, E 1/2, NW 1/4
Sec. 36, N 1/2, SE 1/4

T. 5S., R. 20E.; UM

Sec. 2, SW 1/4
Sec. 3-6, ALL
Sec. 7, N 1/2
Sec. 8-11, ALL
Sec. 12, SW 1/4
Sec. 13-15, ALL
Sec. 16, E. 1/2
Sec. 22, E 1/2, NW 1/4
Sec. 23-25, ALL
Sec. 26, E 1/2, NW 1/4
Sec. 27, NE 1/4
Sec. 35, E 1/2
Sec. 36, ALL

T. 4S., R. 20E.; UM

Sec. 31, W. 1/2, SE 1/4
Sec. 32, SW 1/4

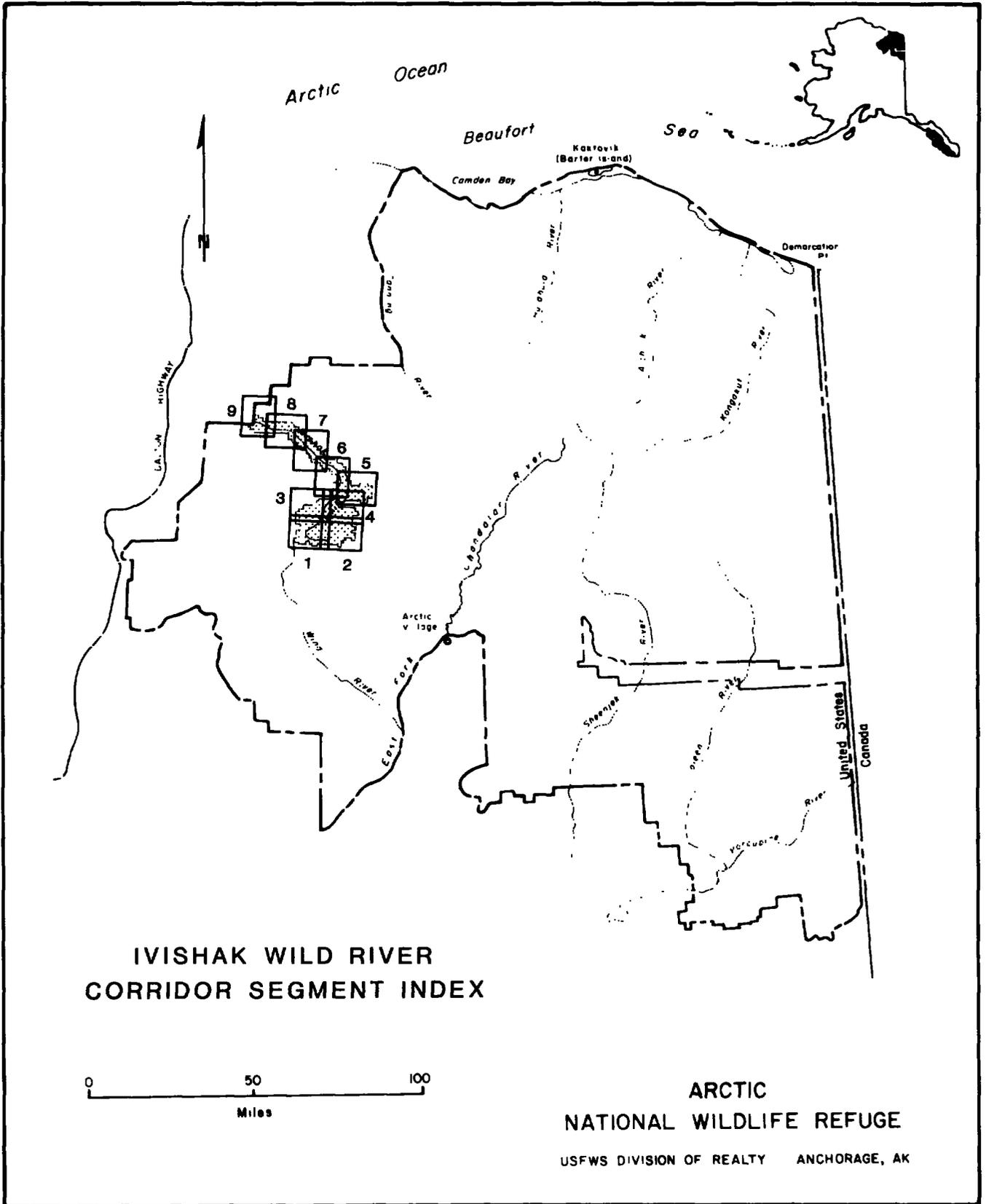
T. 4S., R. 19E.; UM

Sec. 31-36, ALL

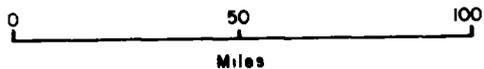
T. 4S., R. 18E.; UM

Sec. 21, W 1/2, SE 1/4
Sec. 26, S 1/2
Sec. 27, W 1/2, SE 1/4
Sec. 28, ALL
Sec. 33-36, ALL

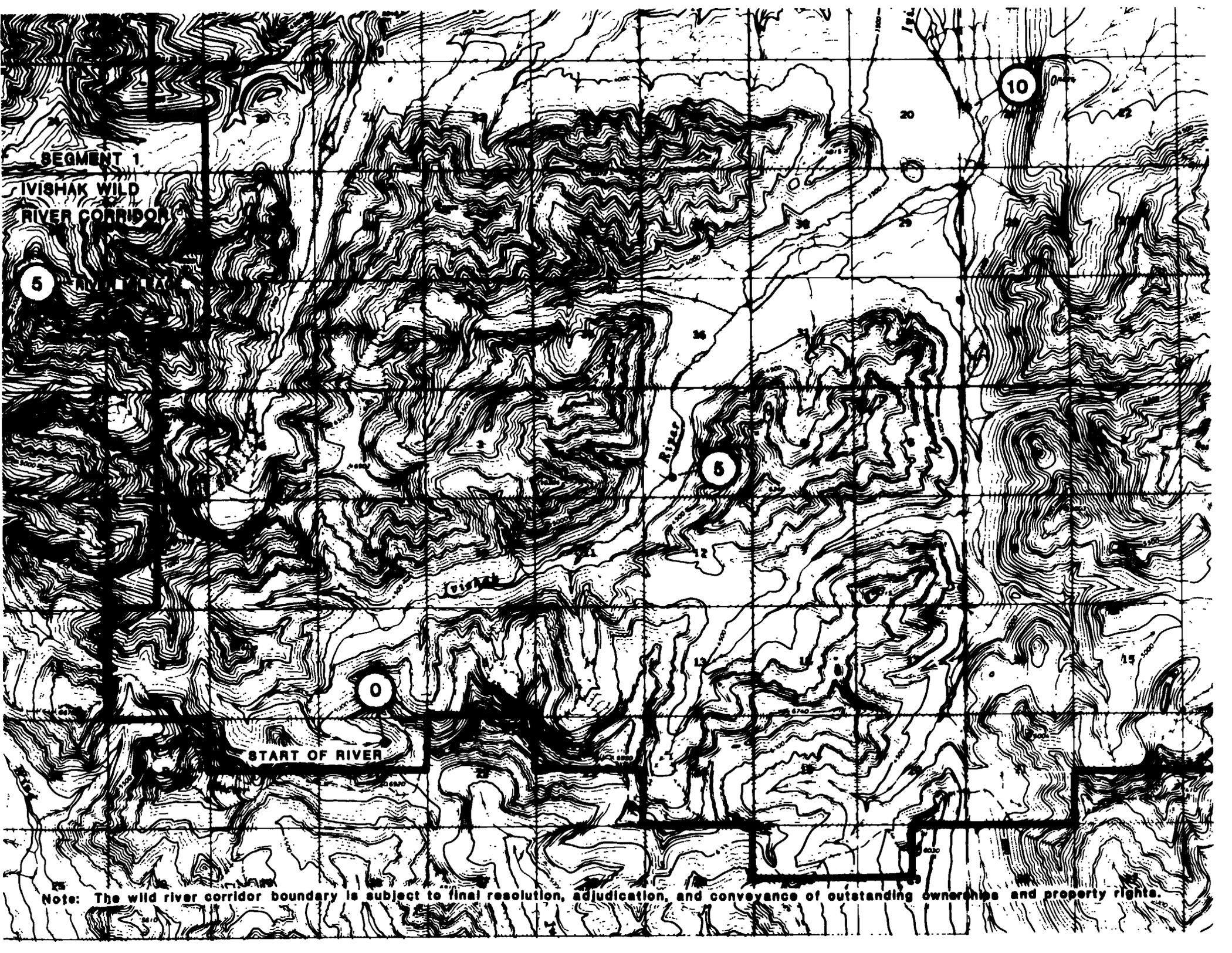
Ivishak Wild River Corridor



IVISHAK WILD RIVER
CORRIDOR SEGMENT INDEX



ARCTIC
NATIONAL WILDLIFE REFUGE
USFWS DIVISION OF REALTY ANCHORAGE, AK



SEGMENT 1

IVISHAK WILD
RIVER CORRIDOR

5

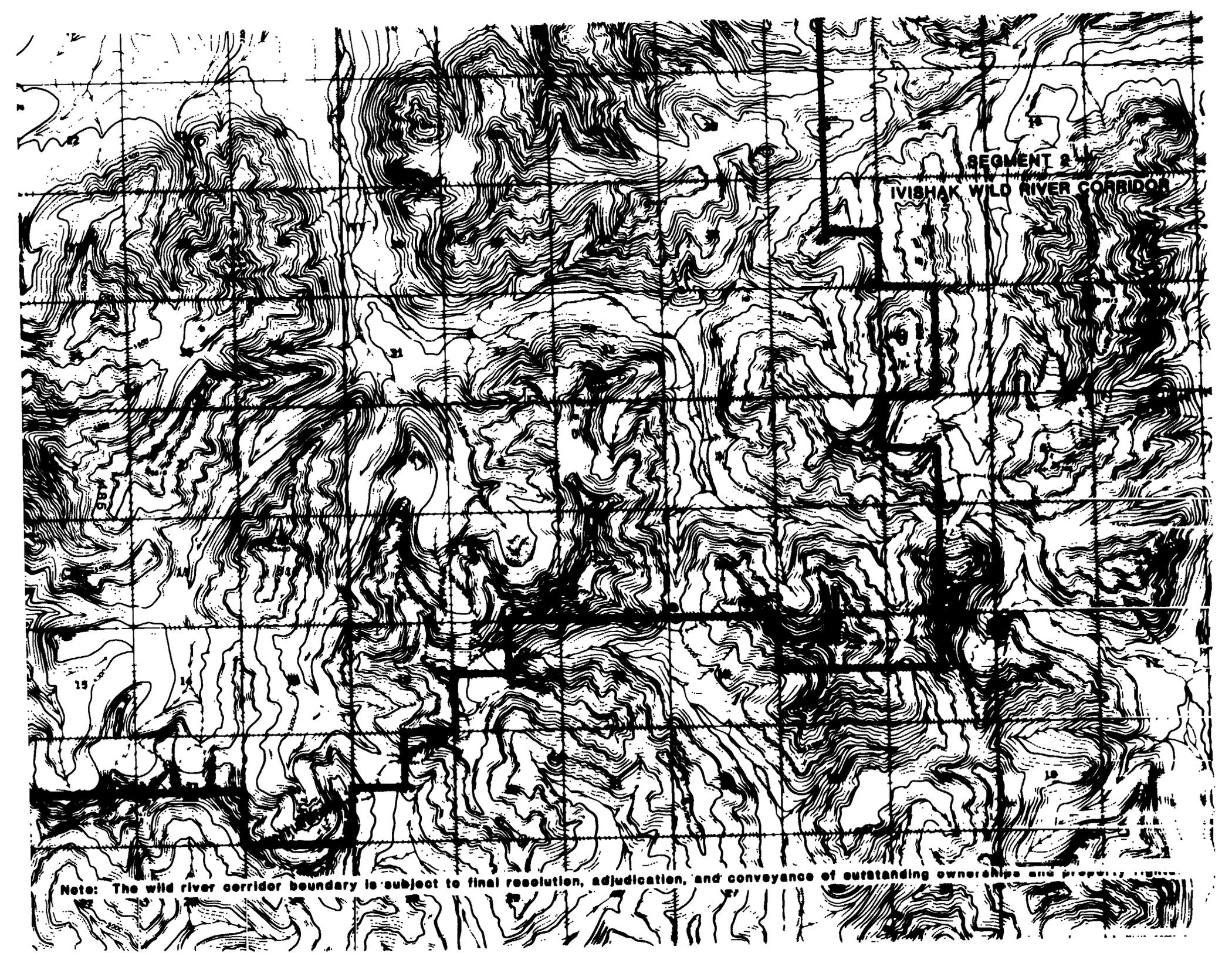
10

5

0

START OF RIVER

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

A detailed topographic map showing a river corridor. The map features a grid of latitude and longitude lines. The terrain is represented by dense contour lines, indicating a hilly or mountainous region. A river channel is visible, winding through the landscape. The text 'SEGMENT 2' and 'IVISHAK WILD RIVER CORRIDOR' is printed in the upper right quadrant of the map.

SEGMENT 2
IVISHAK WILD RIVER CORRIDOR

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownership and property rights.

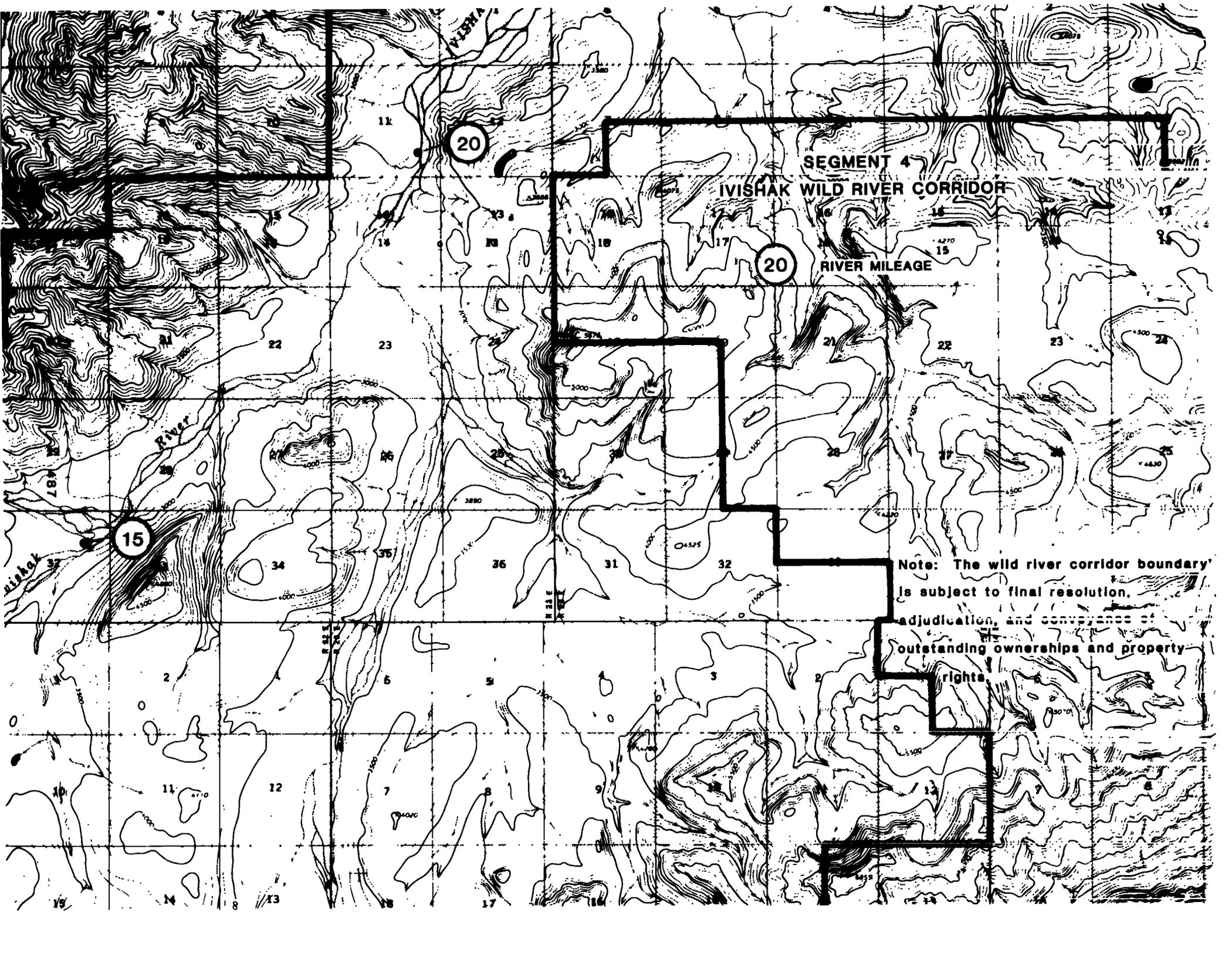
SEGMENT 3
IVISHAK WILD RIVER CORRIDOR

15

RIVER MILEAGE

15

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.



**SEGMENT 4
IVISHAK WILD RIVER CORRIDOR**

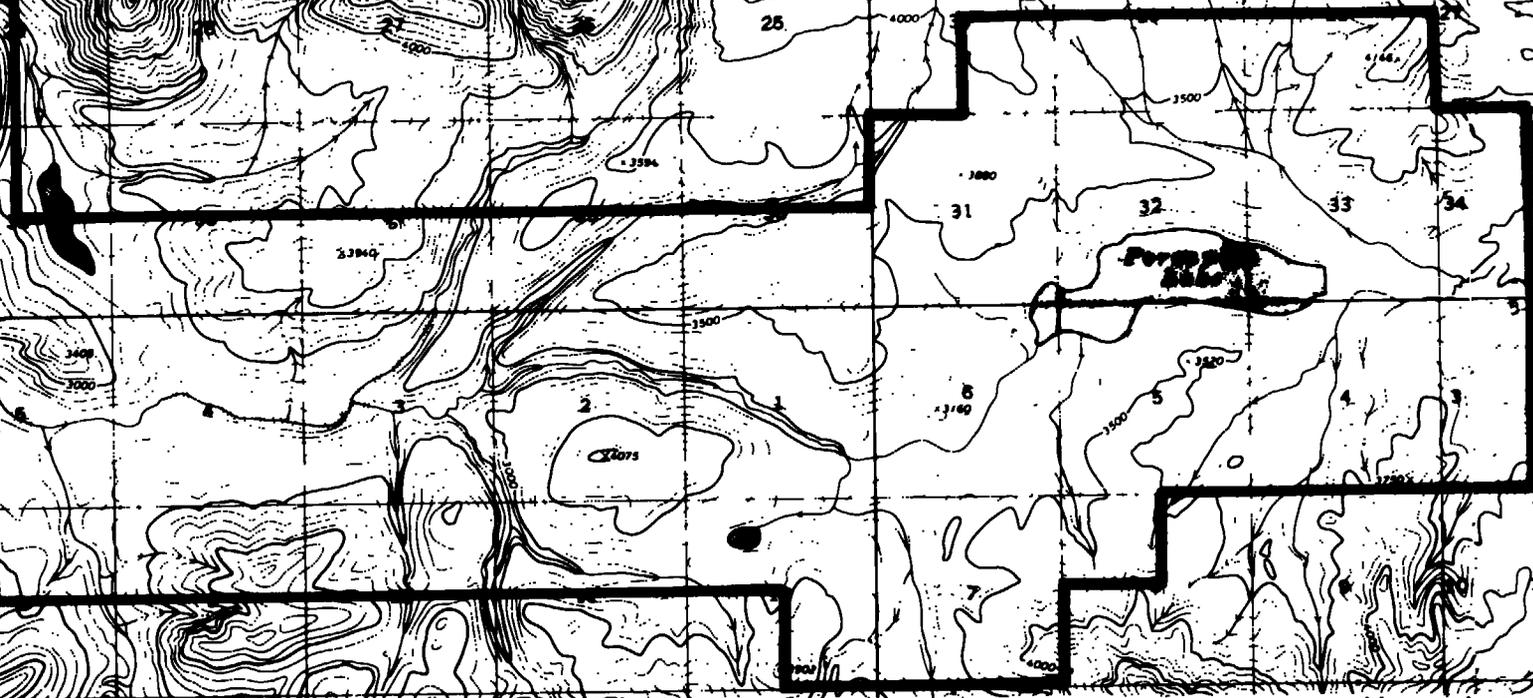
20
RIVER MILEAGE

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

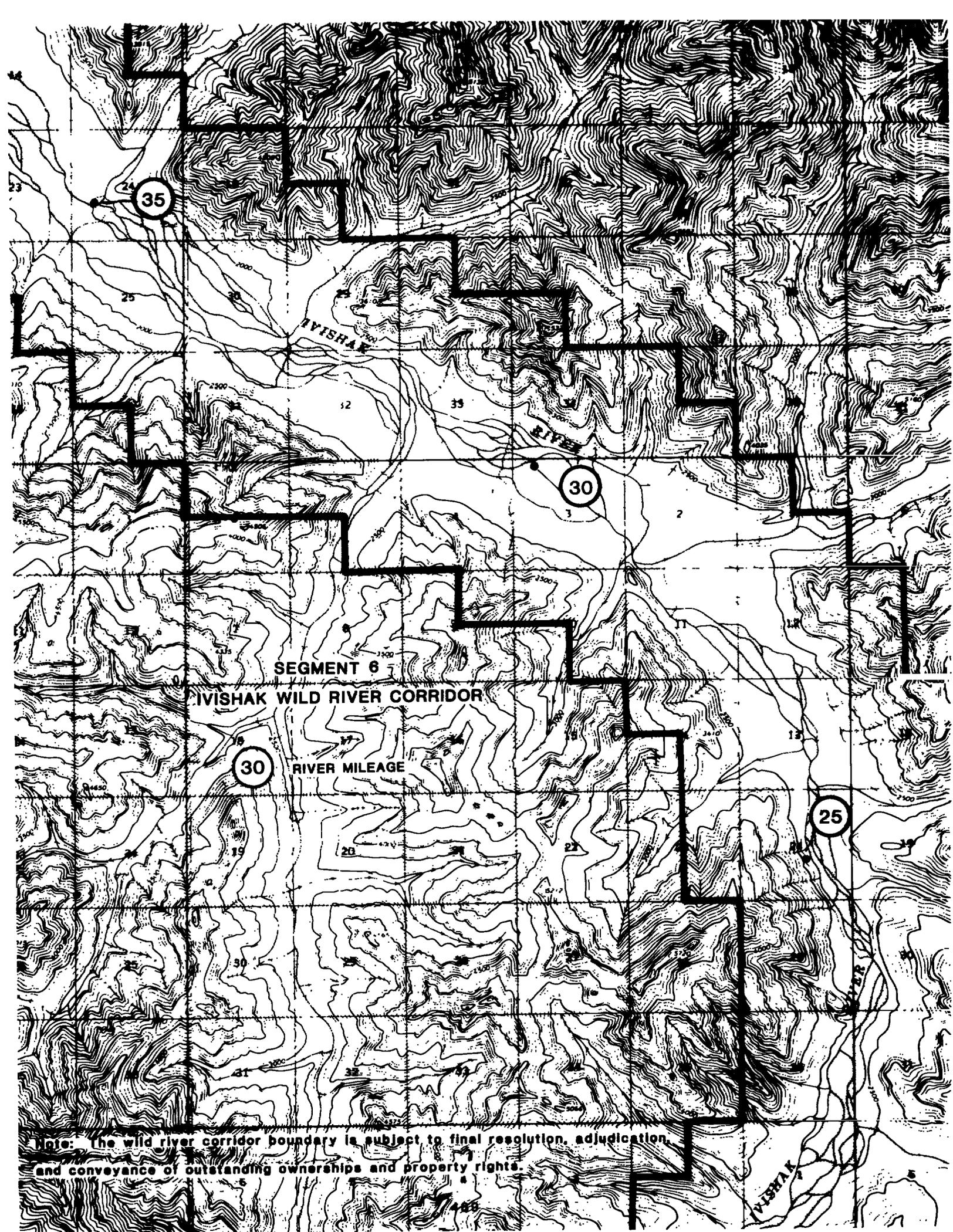
SEGMENT 5
IVISHAK WILD RIVER CORRIDOR

25 RIVER MILEAGE

25



Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.



Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

SEGMENT 7
WIVISHAK WILD RIVER CORRIDOR

RIVER MILEAGE

45

40

40

35

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

SEGMENT 8

IVISHAK WILD RIVER CORRIDOR

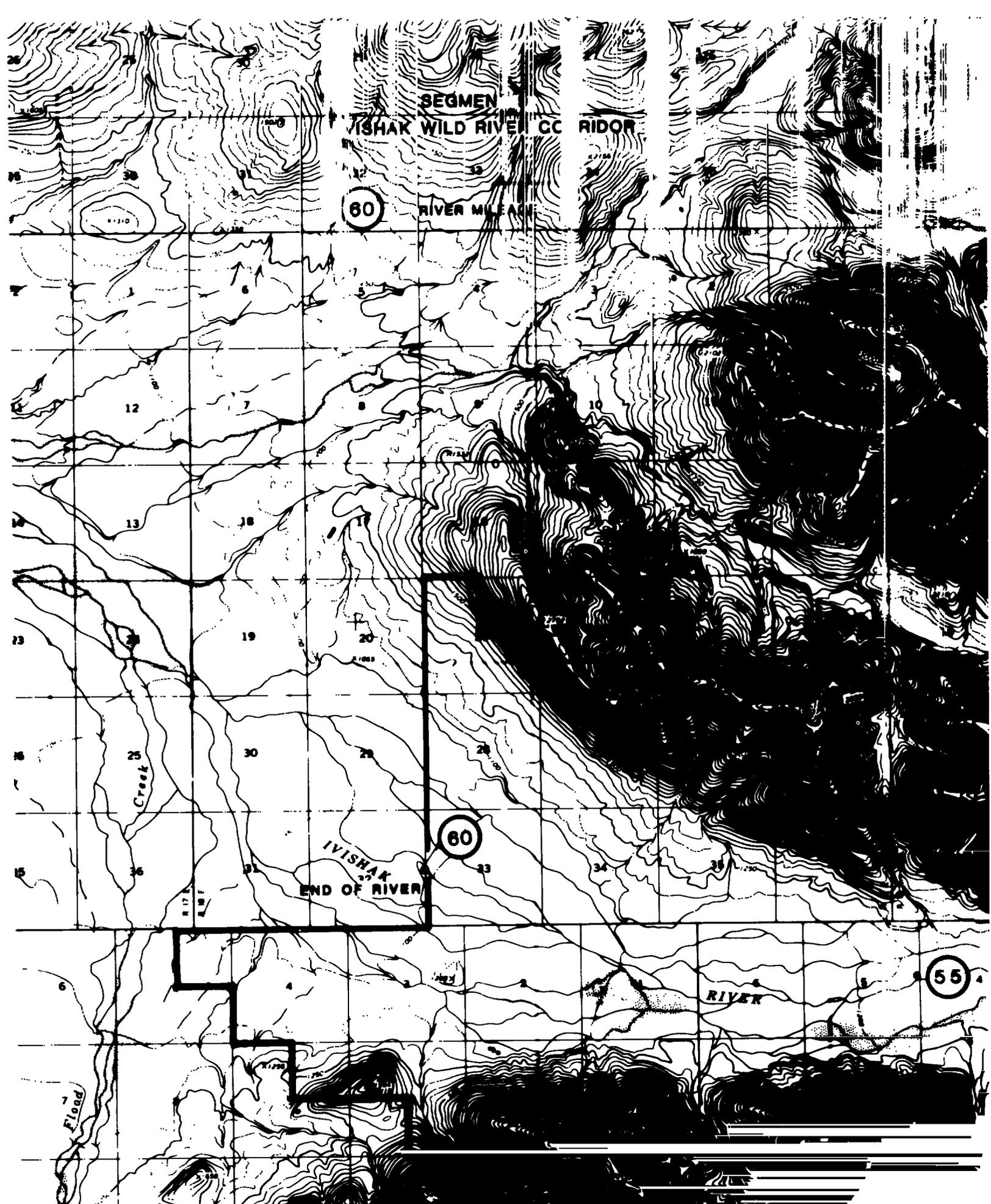
50 RIVER MILEAGE

55

50

45

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.



Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

Legal Description of the Upper Sheenjek Wild River Corridor

T. 31N., R. 16E.; FM

Sec. 3-5, All
Sec. 8-10, ALL
Sec. 14, SW 1/4
Sec. 15-17, ALL
Sec. 20, E 1/2, NW 1/4
Sec. 21 and 22, ALL
Sec. 27, W 1/2
Sec. 28, ALL
Sec. 29, E 1/2
Sec. 32, E 1/2
Sec. 33, ALL
Sec. 34, W 1/2

T. 33N., R. 16E., FM

Sec. 12, S 1/2
Sec. 13, ALL
Sec. 14, E 1/2, SW 1/4
Sec. 22, E 1/2
Sec. 23-27, ALL
Sec. 33, E 1/2
Sec. 34 and 35, ALL
Sec. 36, N 1/2, SW 1/4

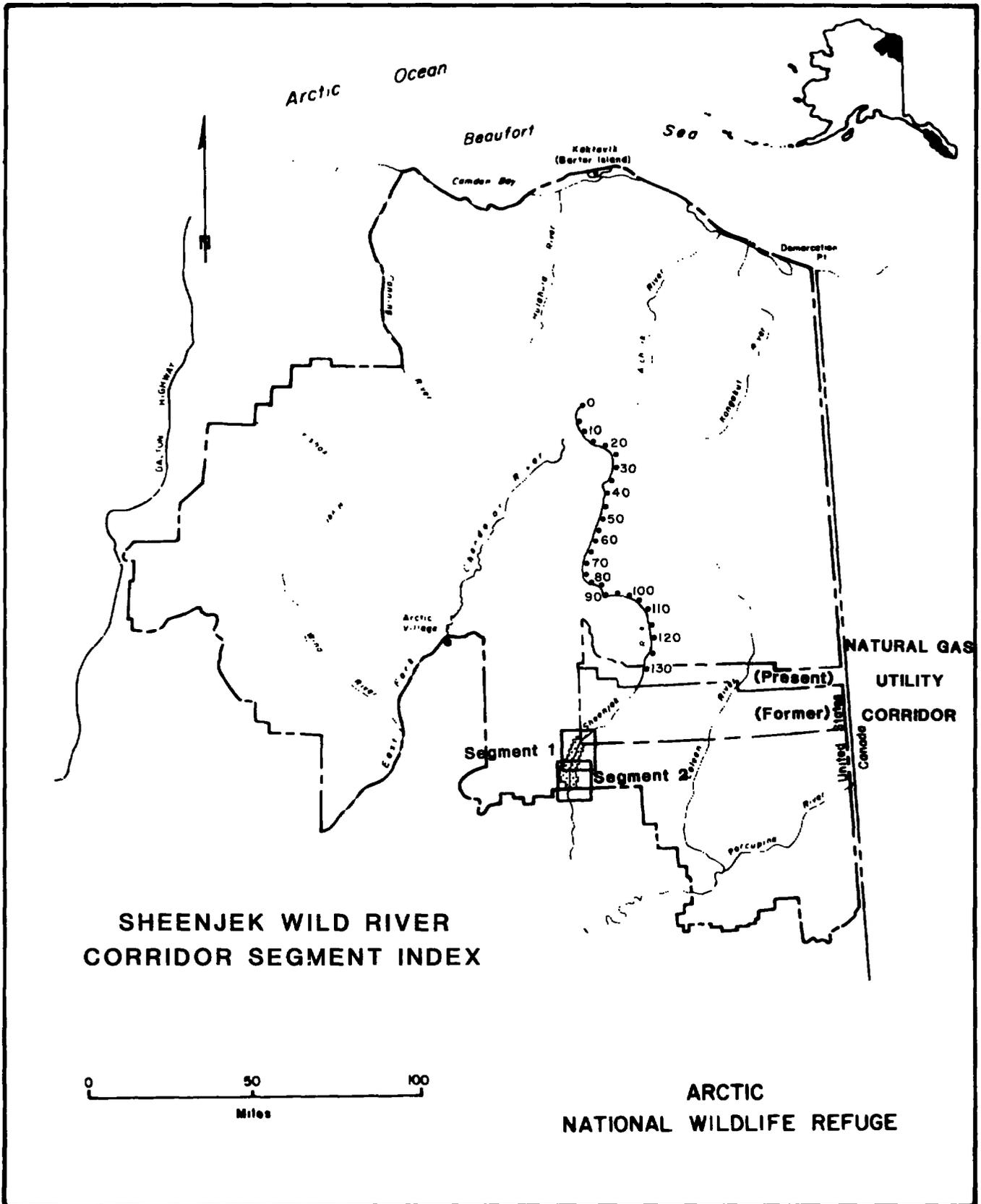
T. 32N., R. 17E., FM

Sec. 6, ALL
Sec. 7, N 1/2, SW 1/4
Sec. 18, NW 1/4

T. 32N., R. 16E.; FM

Sec. 1 and 2, ALL
Sec. 3, E 1/2
Sec. 10, E 1/2, SW 1/4
Sec. 11-15, ALL
Sec. 16, E 1/2
Sec. 21, E 1/2, SW 1/4
Sec. 22, all excluding F-22661 HP APLN
Sec. 23, ALL
Sec. 24, W 1/2
Sec. 26, N 1/2, SW 1/4
Sec. 27 and 28, ALL
Sec. 29, E 1/2
Sec. 32, E 1/2, SW 1/4
Sec. 33 and 34, ALL
Sec. 35, W 1/2

Sheenjek Wild River Corridor



SHEENJEK WILD RIVER
CORRIDOR SEGMENT INDEX

ARCTIC
NATIONAL WILDLIFE REFUGE

SEGMENT 1

SHEENJEK WILD RIVER CORRIDOR

148 RIVER MILEAGE

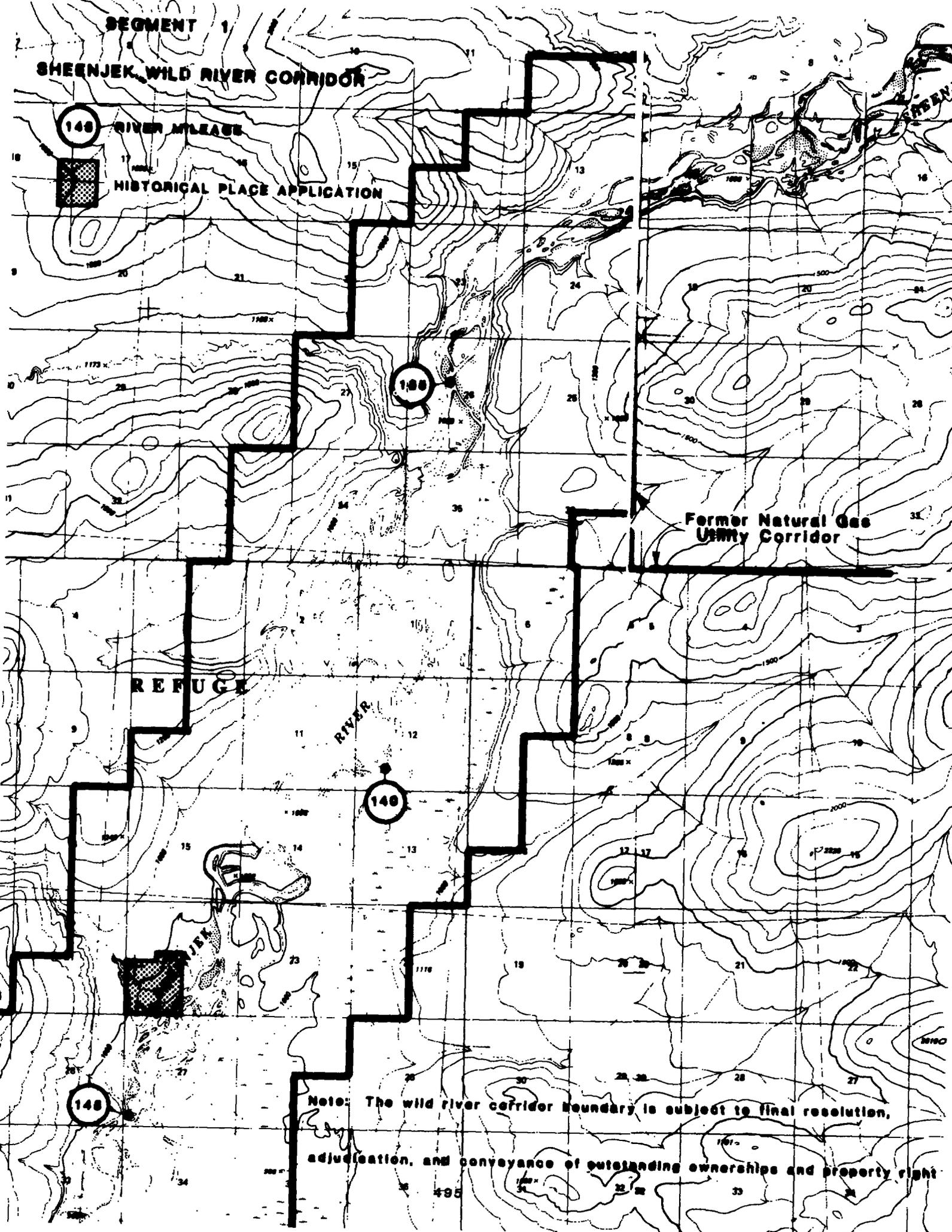
HISTORICAL PLACE APPLICATION

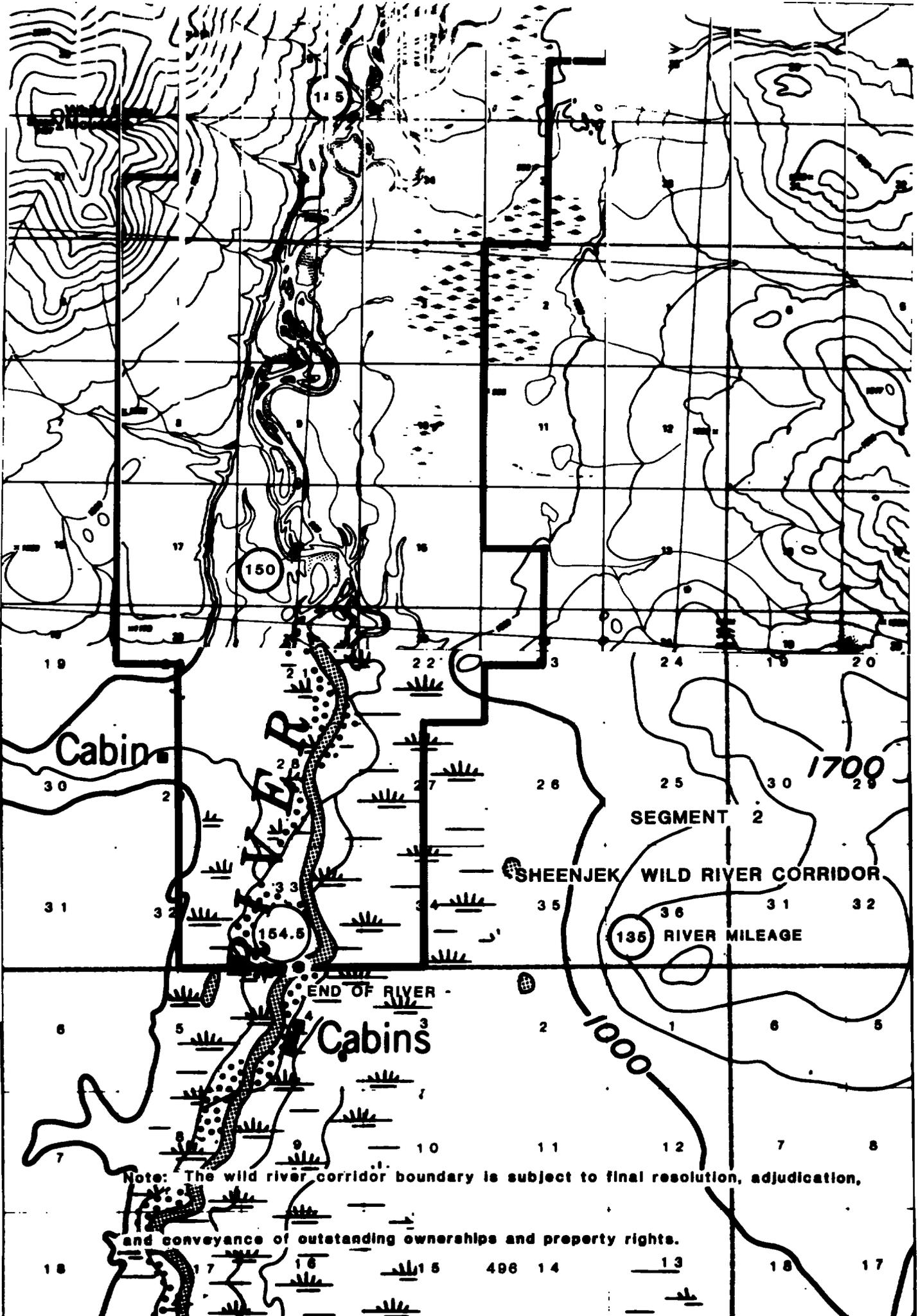
Former Natural Gas Utility Corridor

REFUGE

RIVER

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property right





Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

18 17 16 15 496 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Legal Description of the Wind Wild River Corridor

T. 34N., R. 7E.; FM

Sec. 3, S 1/2, west of the East Fork
of the Chandalar River
Sec. 4-6, ALL
Sec. 7, NE 1/4
Sec. 8 and 9, ALL
Sec. 10, west of the East Fork of the
Chandalar River, excluding
F-22655 HP APLN
Sec. 15, west of the East Fork of the
Chandalar River
Sec. 16, E 1/2, NW 1/4

T. 35N., R. 5E.; FM

Sec. 1-3, ALL
Sec. 4, NE 1/4
Sec. 11, NE 1/4
Sec. 12, ALL
Sec. 13, NE 1/4

T. 36N., R. 6E.; FM

Sec. 31, SW 1/4

T. 36N., R. 5E.; FM

Sec. 15-17, S 1/2
Sec. 18-22, ALL
Sec. 23, W 1/2, SE 1/4
Sec. 26-29, ALL
Sec. 30, N 1/2
Sec. 33, E 1/2
Sec. 34-36, ALL

T. 37N., R. 4E.; FM

Sec. 29, S 1/2, SW 1/4
Sec. 30, S 1/2
Sec. 31, ALL
Sec. 32, W 1/2, SE 1/4

T. 34N., R. 6E.; FM

Sec. 1, NE 1/4

T. 35N., R. 7E.; FM

Sec. 19, SW 1/4
Sec. 30-32, ALL

T. 35N., R. 6E.; FM

Sec. 5, SW 1/4
Sec. 6, W 1/2, SE 1/4
Sec. 7-9, ALL
Sec. 10, All excluding F-18788 NA APLN
Sec. 11, W 1/2, SE 1/4
Sec. 13, W 1/2
Sec. 14-17, ALL
Sec. 18, E 1/2, NW 1/4
Sec. 20, NE 1/4
Sec. 21, N 1/2
Sec. 22, E 1/2, NW 1/4
Sec. 23-25, ALL
Sec. 26, E 1/2, NW 1/4
Sec. 36, ALL

T. 36N., R 4E.; FM

Sec. 4, W 1/2, SE 1/4
Sec. 5, ALL
Sec. 6, E 1/2, NW 1/4
Sec. 8 and 9, ALL
Sec. 10, W 1/2, SE 1/4
Sec. 11, SW 1/4
Sec. 13, ALL
Sec. 14, ALL excluding F-85065 NA APLN
Sec. 15, ALL excluding F-84649 NA APLN
Sec. 16, ALL
Sec. 17, E 1/2, NW 1/4
Sec. 21, NE 1/4
Sec. 22, E 1/2, NW 1/4, excluding
F-84649 NA APLN
Sec. 23 and 24, ALL

T. 37N., R. 3E.; FM

Sec. 25, S 1/2
Sec. 26, S 1/2, SE 1/4
Sec. 35, NE 1/4
Sec. 36, ALL.

T. 16S., R. 22E.; UM

Sec. 5, NW 1/4
Sec. 6 and 7, ALL.
Sec. 8, W 1/2, SE 1/4
Sec. 15, SW 1/4
Sec. 16-18, ALL.
Sec. 19, E 1/2, NW 1/4
Sec. 20-22, ALL
Sec. 23, W 1/2, SE 1/4
Sec. 26 and 27, ALL.
Sec. 28, N 1/2
Sec. 29, NE 1/4
Sec. 34 and 35, ALL.
Sec. 36, W 1/2, SE 1/4

T. 15S., R. 21E.; UM

Sec. 1, NW 1/4
Sec. 2 and 3, ALL.
Sec. 10 and 11, ALL.
Sec. 13, W 1/2, SE 1/4
Sec. 14 and 15, ALL.
Sec. 22, E 1/2, NW 1/4
Sec. 23-25, ALL.
Sec. 26, N 1/2
Sec. 36, ALL.

T. 14S., R. 20E.; UM

Sec. 1 and 2, ALL.
Sec. 3 and 4, N 1/2

T. 13S., R. 20E.; UM

Sec. 1, W 1/2
Sec. 2, ALL
Sec. 3, E 1/2
Sec. 4, W 1/2, SE 1/4
Sec. 5-11, ALL
Sec. 12, W 1/2, SE 1/4
Sec. 13-36, ALL

T. 17S., R. 23E.; UM

Sec. 6, NW 1/4

T. 17S., R. 22E.; UM

Sec. 1 and 2, N 1/2
Sec. 3, NE 1/4

T. 16S., R. 21E.; UM

Sec. 1, ALL
Sec. 12, ALL
Sec. 13, E 1/2

T. 15S., R. 22E.; UM

Sec. 18, SW 1/4
Sec. 19, ALL
Sec. 20, SW 1/4
Sec. 29, W 1/2
Sec. 30 and 31, ALL
Sec. 32, W 1/2

T. 14S., R. 21E.; UM

Sec. 2, W 1/2
Sec. 3-6, ALL
Sec. 9, E 1/2, NW 1/4
Sec. 10 and 11, ALL
Sec. 14, N 1/2, SW 1/4
Sec. 15, ALL
Sec. 16, E 1/2
Sec. 21 and 22, ALL
Sec. 23, W 1/2
Sec. 26, W 1/2, SE 1/4
Sec. 27 and 28, ALL
Sec. 33, E 1/2
Sec. 34 and 35, ALL
Sec. 36, W 1/2

T. 13S., R. 19E.; UM

Sec. 1-8, ALL
Sec. 19, N 1/2, SE 1/4
Sec. 20-28, ALL
Sec. 29, E 1/2
Sec. 34-36, ALL

T. 13S., R. 18E.; UM

Sec. 1, E 1/2
Sec. 12 and 13, E 1/2

T. 12S., R. 19E.; UM

Sec. 9, S 1/2
Sec. 14, SW 1/4
Sec. 15, W 1/2, SE 1/4
Sec. 16, E 1/2, NW 1/4
Sec. 20, S 1/2
Sec. 21, E 1/2, SW 1/4
Sec. 22, ALL
Sec. 23, W 1/2, SE 1/4
Sec. 26-29, ALL
Sec. 30, SE 1/4
Sec. 31, E 1/2, SW 1/4
Sec. 32-36, ALL

T. 11S., R. 21E., UM

Sec. 2, W 1/2, SE 1/4
Sec. 3-11, ALL
Sec. 14, N 1/2, SW 1/4
Sec. 15-22, ALL
Sec. 23, NW 1/4
Sec. 27, W 1/2
Sec. 28-31, ALL
Sec. 32, N 1/2

T. 10S., R. 21E.; UM

Sec. 18, SW 1/4
Sec. 19, ALL
Sec. 20, S 1/2
Sec. 27, SW 1/4
Sec. 28-34, ALL

T. 10S., R. 20E.; UM

Sec. 13, S 1/2
Sec. 14 and 15, ALL
Sec. 22-26, ALL
Sec. 27, E 1/2
Sec. 33, E 1/2
Sec. 34-36, ALL

T. 12S., R. 21E.; UM

Sec. 6, NW 1/4

T. 12S., R. 20E.; UM

Sec. 1-4, ALL
Sec. 9 and 10, ALL
Sec. 11, N 1/2, SW 1/4
Sec. 12, NW 1/4
Sec. 15 and 16, ALL
Sec. 17, E 1/2
Sec. 20 and 21, ALL
Sec. 22, W 1/2
Sec. 27, W 1/2
Sec. 28 and 29, ALL
Sec. 31, SW 1/4
Sec. 32, E 1/2, NW 1/4
Sec. 33 and 34, ALL

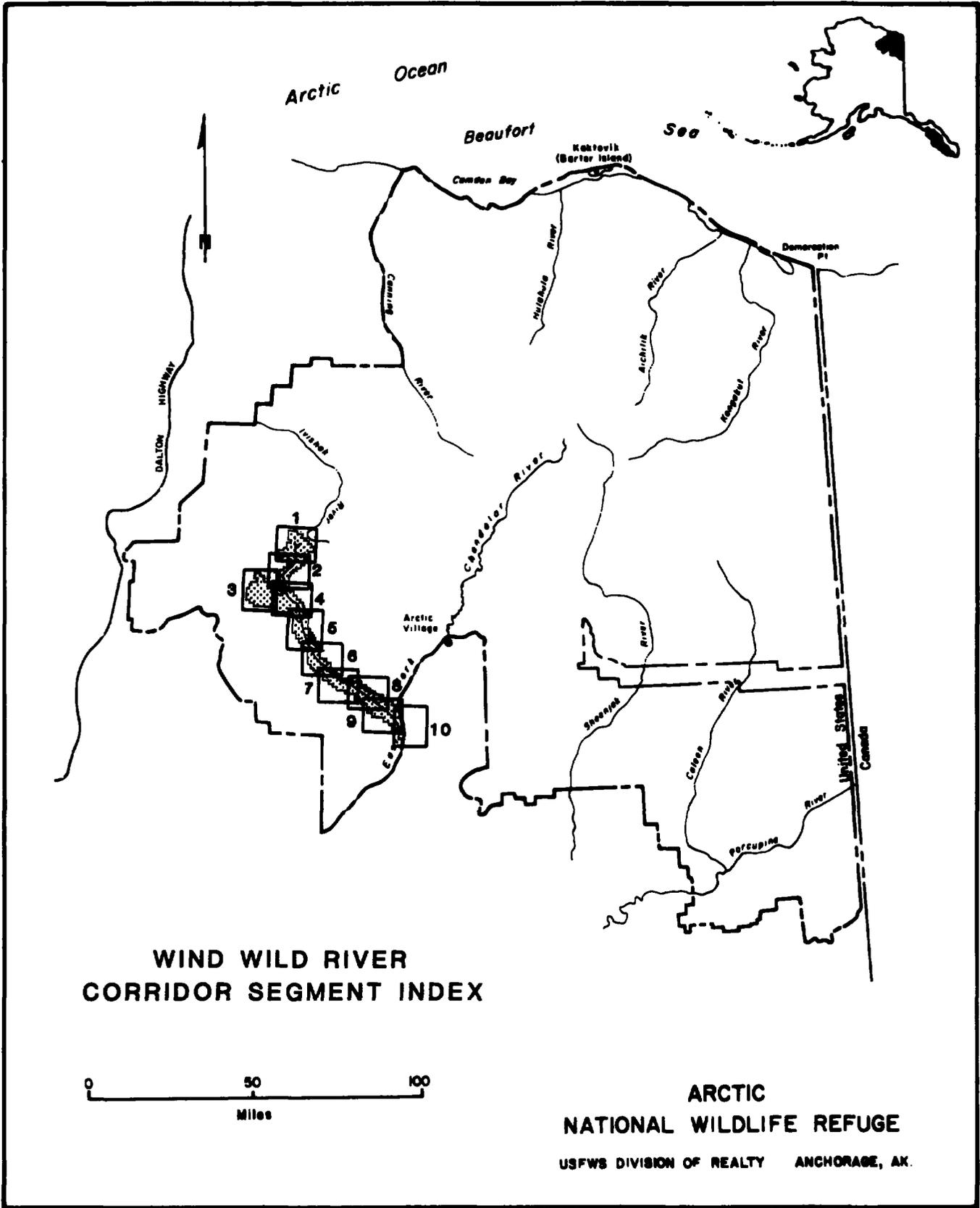
T. 12S., R. 18W.; UM

Sec. 35, SE 1/4
Sec. 36, S 1/2

T. 11S., R. 20E.; UM

Sec. 1-3, ALL
Sec. 4, E 1/2, SW 1/4
Sec. 8, E 1/2, SW 1/4
Sec. 9-18, ALL
Sec. 19, N 1/2
Sec. 20, NW 1/4
Sec. 21, E 1/2, NW 1/4
Sec. 22-27, ALL
Sec. 33, E 1/2
Sec. 34-36, ALL

Wind Wild River Corridor



SEGMENT 1

WIND WILD RIVER CORRIDOR

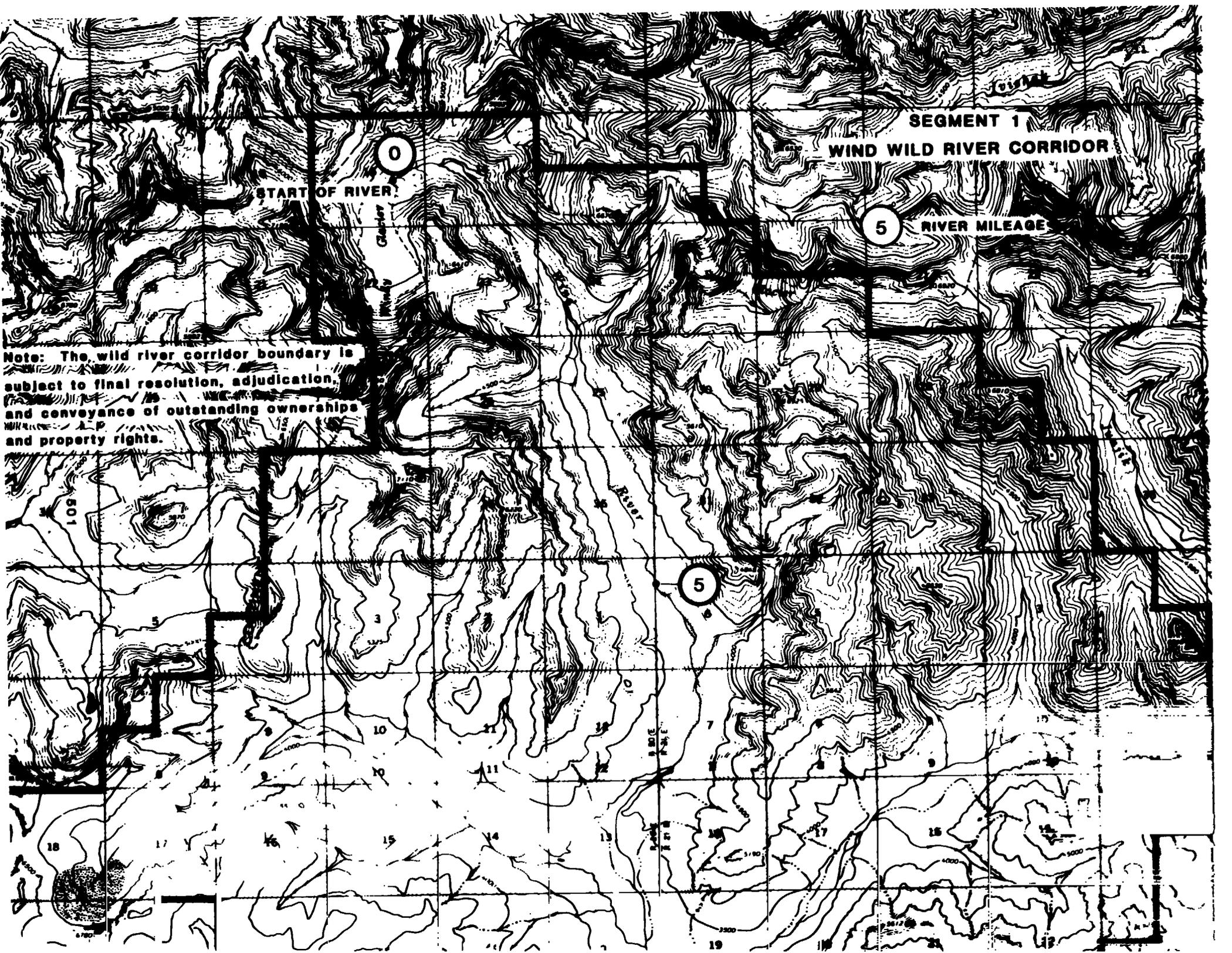
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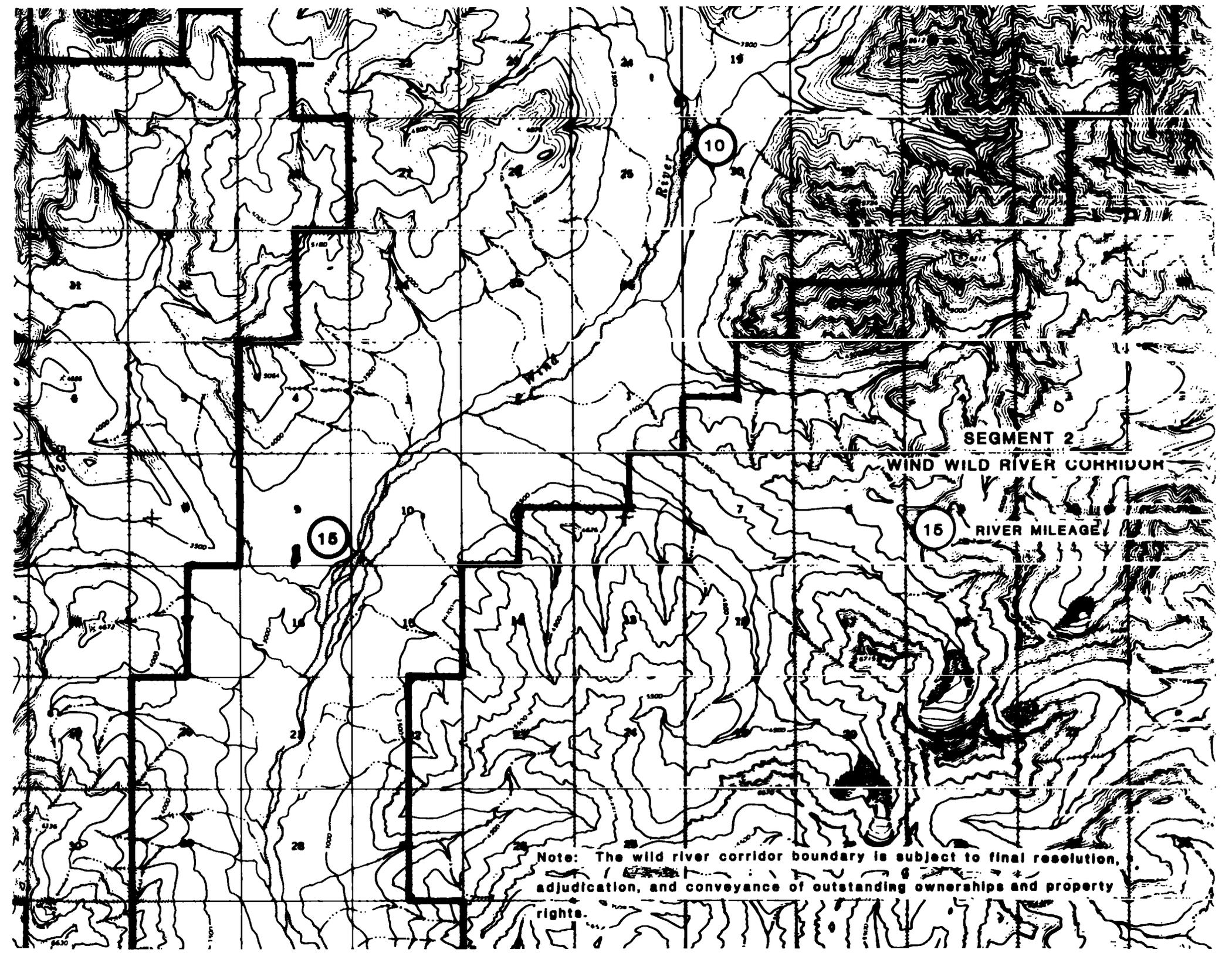
START OF RIVER

5

RIVER MILEAGE

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.



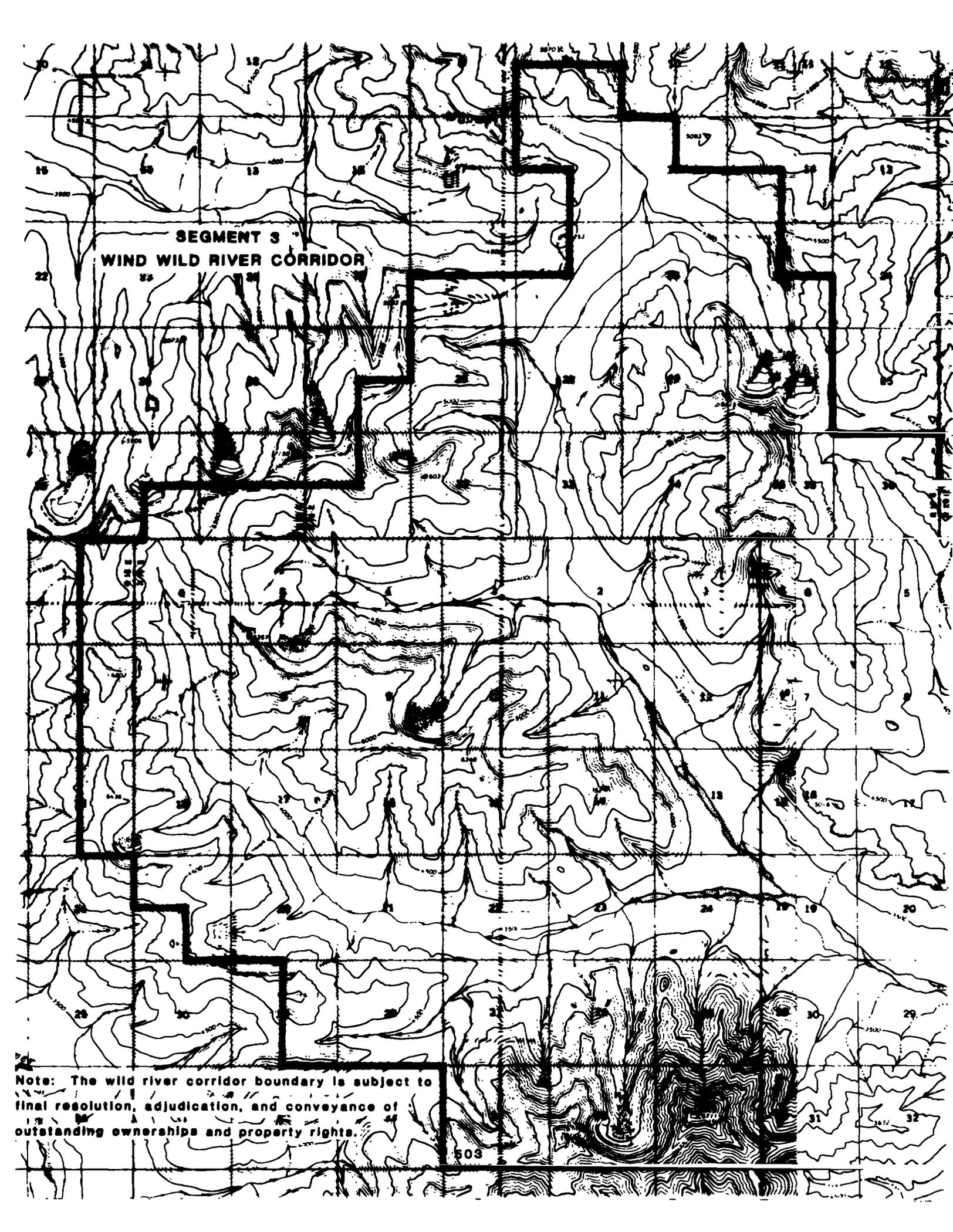


SEGMENT 2

WIND WILD RIVER CORRIDOR

15 RIVER MILEAGE

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

A topographic map showing a river corridor. The map features contour lines representing elevation, a grid system, and a thick black line delineating the corridor boundary. The corridor follows a winding river path through a hilly area. Section numbers are visible throughout the map, including 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, and 32. The text 'SEGMENT 3 WIND WILD RIVER CORRIDOR' is printed in the upper left quadrant.

**SEGMENT 3
WIND WILD RIVER CORRIDOR**

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

**SEGMENT 4
WIND WILD RIVER CORRIDOR**

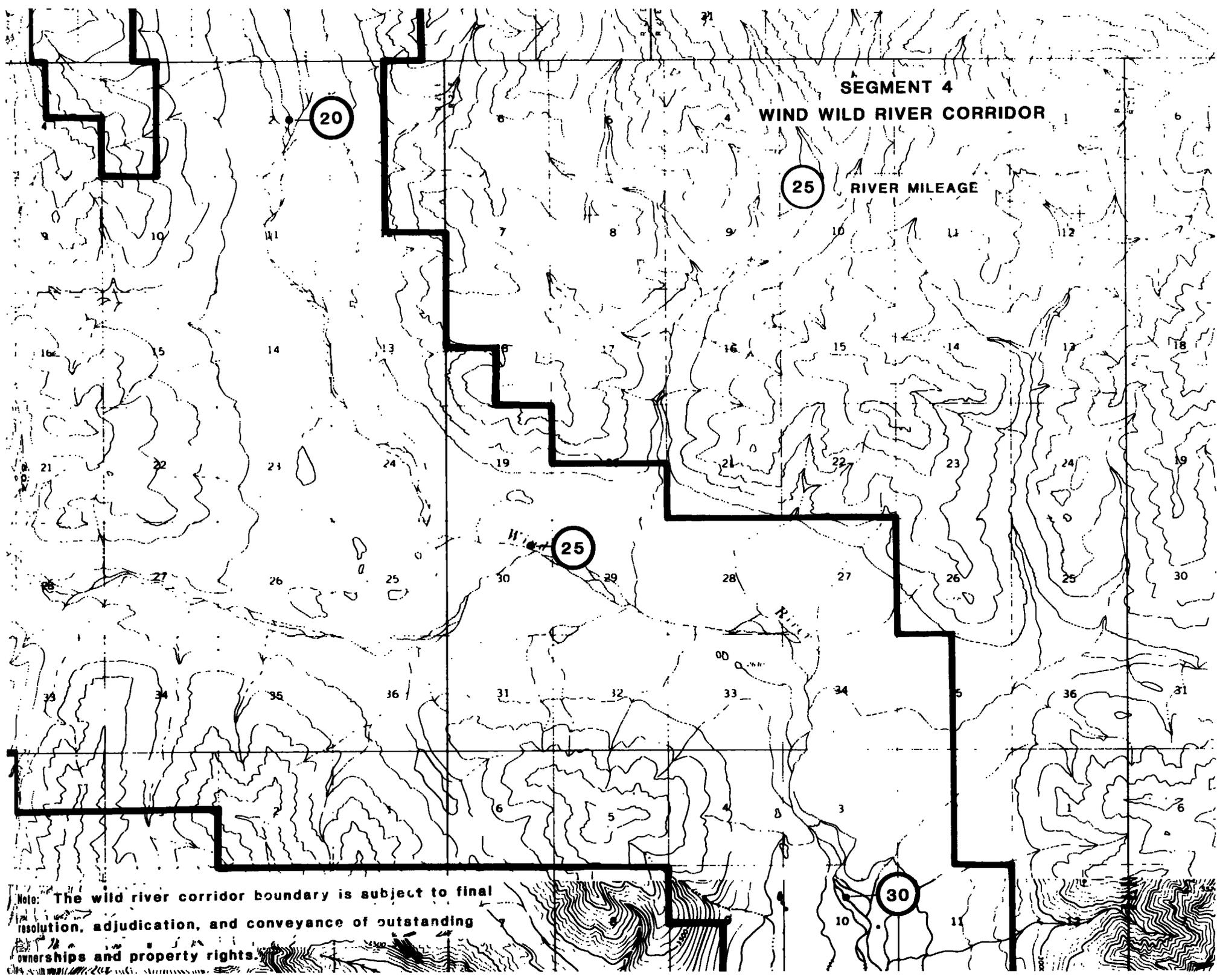
25 RIVER MILEAGE

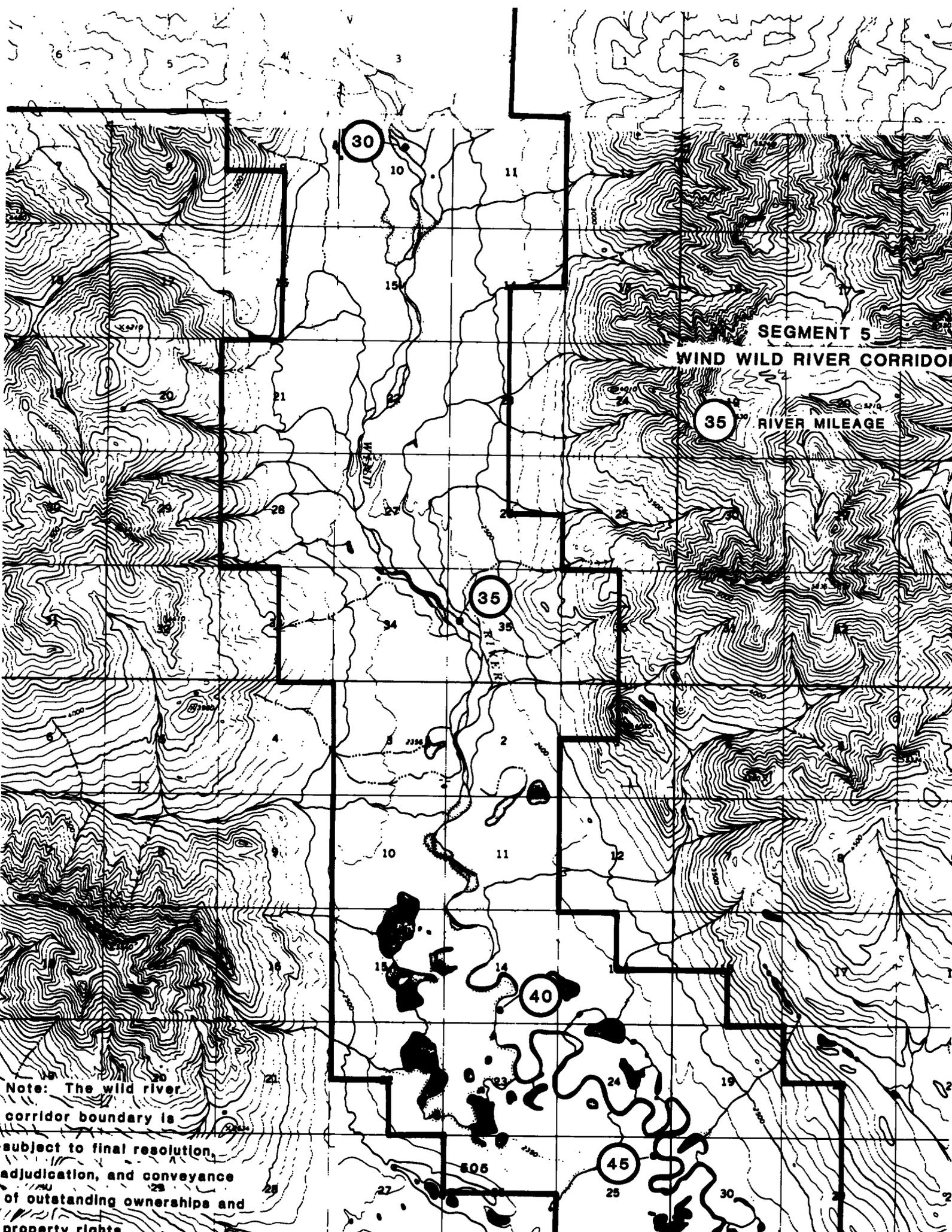
20

25

30

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.





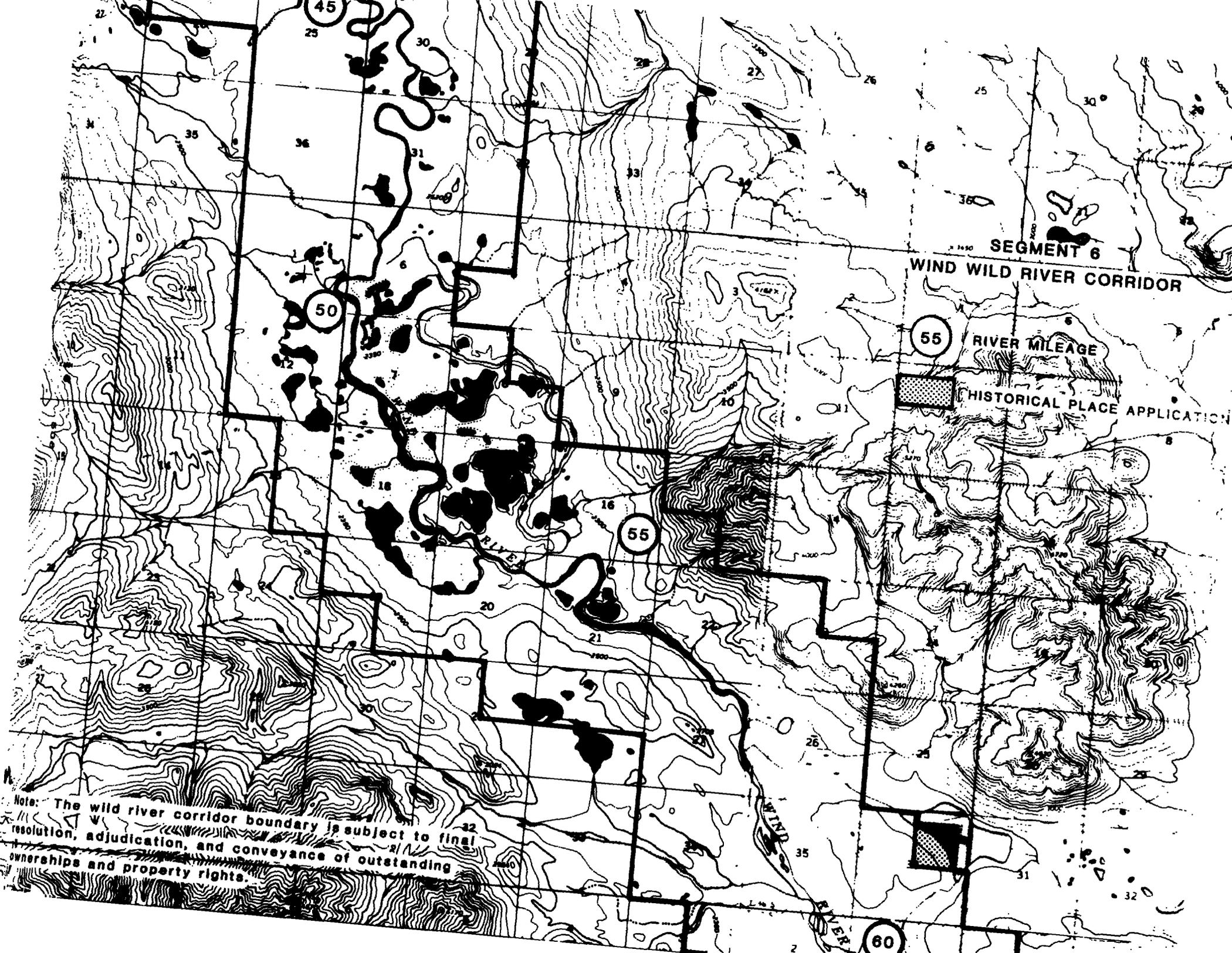
**SEGMENT 5
WIND WILD RIVER CORRIDOR**
RIVER MILEAGE

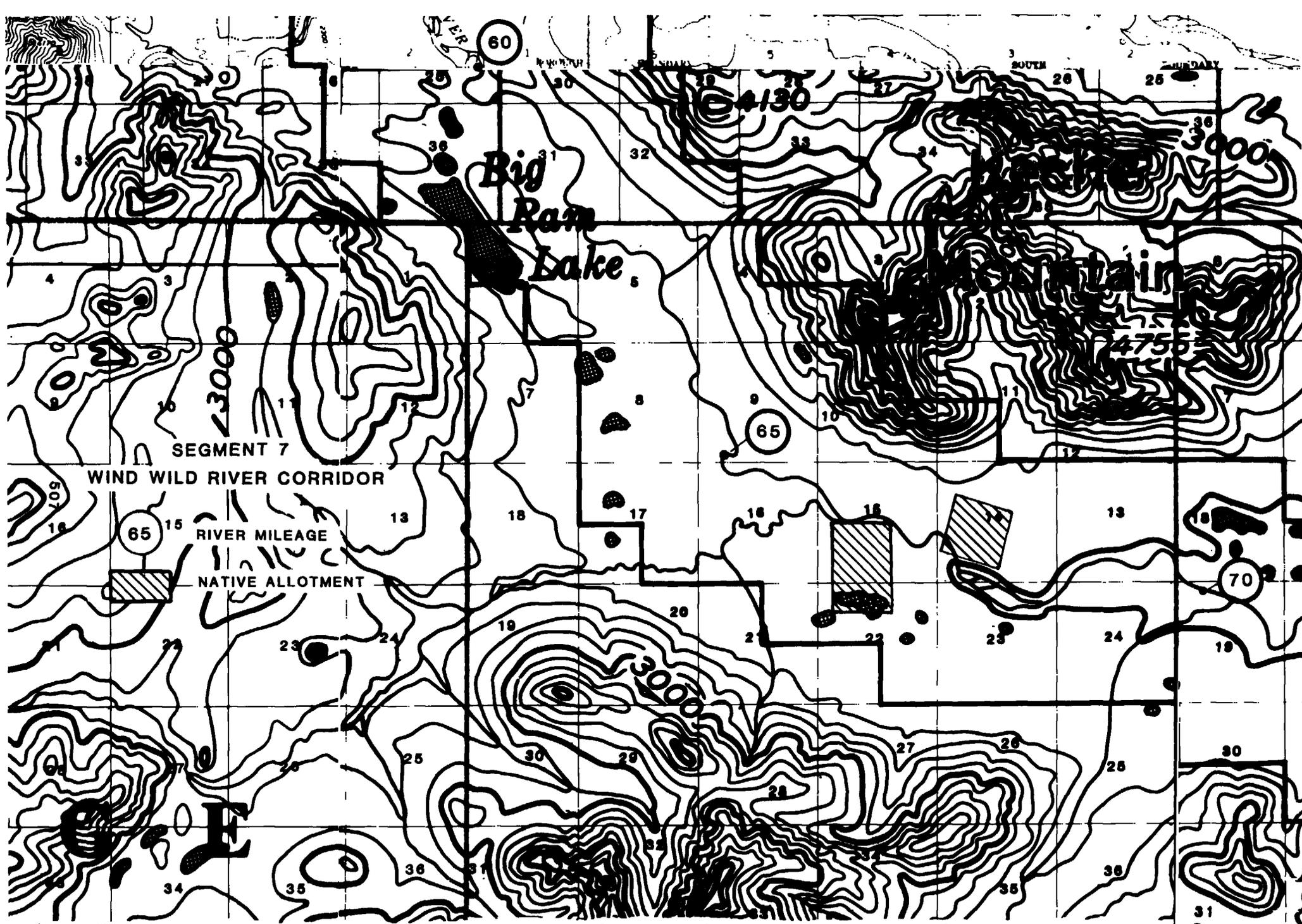
Note: The wild river
corridor boundary is
subject to final resolution,
adjudication, and conveyance
of outstanding ownerships and
property rights.

SEGMENT 6
WIND WILD RIVER CORRIDOR

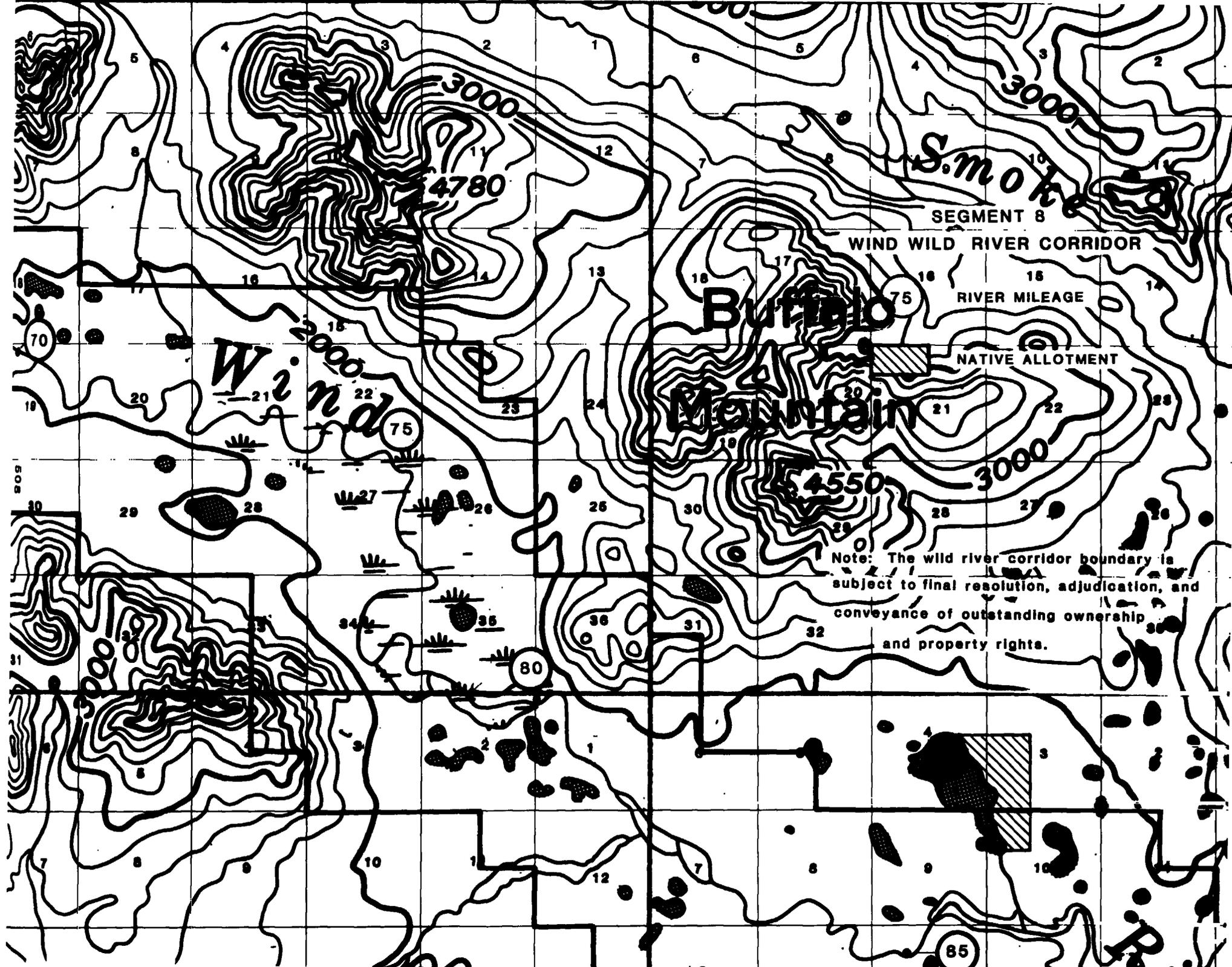
55 RIVER MILEAGE
HISTORICAL PLACE APPLICATION

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.





Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.



S.M.O.K.

SEGMENT 8

WIND WILD RIVER CORRIDOR

RIVER MILEAGE

NATIVE ALLOTMENT

Buffalo

Mountain

Wind

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownership and property rights.

3000
4780

4550
3000

85

80

75

75

70

80

81

10

12

1

36

31

25

24

13

1

2

3

4

5

6

5

4

3

2

8

12

7

10

20

21

22

23

24

16

17

16

16

14

29

28

26

25

30

28

27

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8

1

12

7

8

9

10

11

7

8

1

12

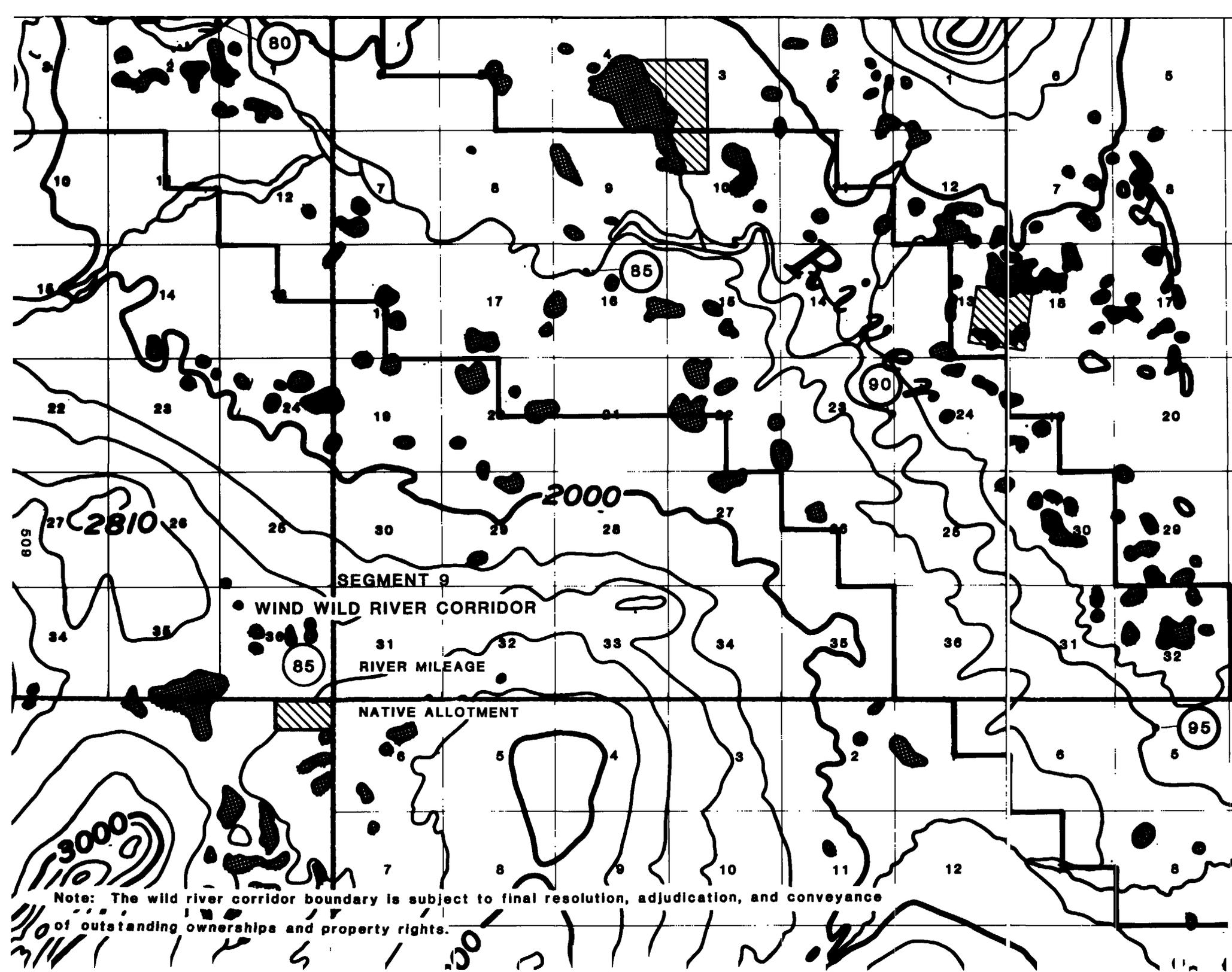
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8

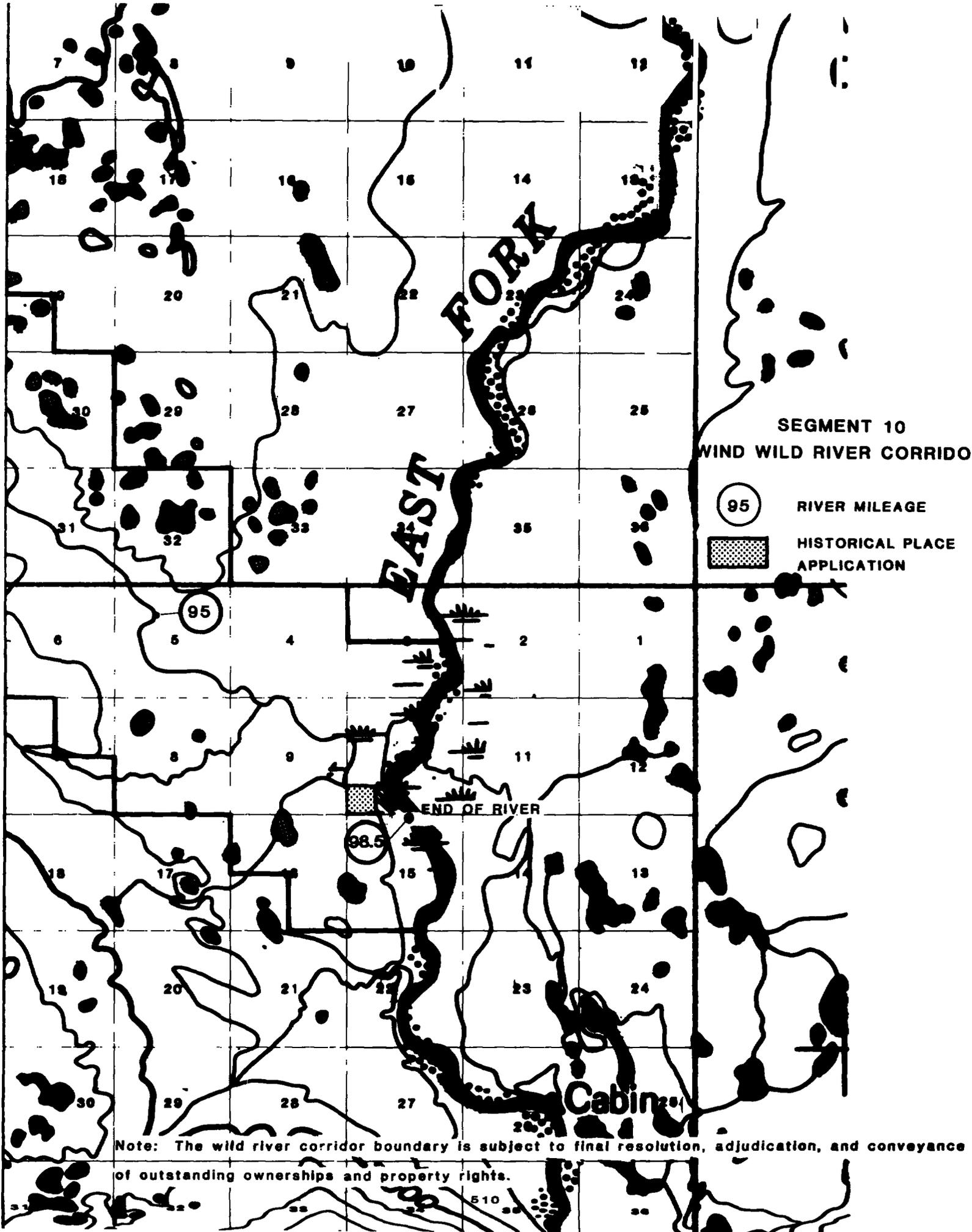
9

10

11



Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.



**SEGMENT 10
WIND WILD RIVER CORRIDOR**

- 95 RIVER MILEAGE
- HISTORICAL PLACE APPLICATION

Note: The wild river corridor boundary is subject to final resolution, adjudication, and conveyance of outstanding ownerships and property rights.

APPENDIX N. Soil Classification for the Arctic Refuge.^{a/}

Rieger et al (1979) mapped the soils of Alaska according to a classification system developed by the U.S. Department of Agriculture. The soil descriptions below are based on that classification and make use of a number of specialized word elements and terms as follows: aqu (wet); bor (northern cool); cry (icy cold); histic (organic); mollic (soft); och (pale); orth (common); pergelic (with permafrost); typic (typical). The major soil orders found on the refuge are Inceptisols, Entisols and Mollisols.

(a) Inceptisols

This order of soils is characterized by having only minor soil processes evident. Two suborders are present on the refuge. These are aquepts and ochrepts. Aquepts are the wetter of the two suborders and are represented by a number of soil associations on the refuge. Aquepts have altered horizons in that they have lost some iron and aluminum, but do not have a horizon containing transported clay.

The histic pergelic cryaquepts, loamy, nearly level to rolling association is widespread in Alaskan permafrost areas. On the refuge it occurs along the east from Spike Mountain to the Old Crow Plain, along the west side of the Coleen River valley, in a large area around the Kones River headwaters, and in the Sadlerochit and Shublik Mountains.

The histic pergelic cryaquepts, loamy, nearly level to rolling pergelic cryorthents, very gravelly, hilly to steep association covers the south Brooks Range broad glacial valleys, including those of the upper Sheenjek. East Fork Chandalar, Wind and Junjik rivers, and Old John Lake. Elevations range from about 2,000 to 3,500 feet (600 to 1,100 m). In valley bottoms, most soils are silty with organics in the lowest areas. Low soils are poorly drained with shallow permafrost, and vegetated mostly by sedges and mosses. Moraine sections are well drained, hills are gravelly and subdued moraines and terraces are loamy. Soils may support stunted spruce forest.

The histic pergelic cryaquepts, loamy, nearly level to rolling-pergelic cryofibrists, nearly level association is most extensive along broad valley bottoms of the lower Coleen, Sheenjek, East Fork Chandalar and Middle Fork of the Chandalar rivers. It also occupies sections of the Kones River Valley, the Porcupine Valley below the ramparts and the Old Crow Plain. Elevations range to about 3,000 feet (900 m). Soils are shallow over permafrost and constantly wet.

The histic pergelic cryaquepts-typic cryochrepts, loamy, nearly level to rolling association occupies a section in the Porcupine Plateau with wide, broad, undulating hills of gentle to moderate slope. Vegetation on long lower slopes and drainageways is black spruce, aspen, grass and brush, except for burned areas that support only willows, grass, forbs and young aspen.

^{a/} The soils information in this appendix was provided by the Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, Fairbanks.

The histic pergelic cryaquepts-typic cryaquepts, very gravelly, hilly to steep association occurs in a small area across the North Fork Chandalar River to Little Rock Mountain. These soils are mostly developed from bedrock colluvium.

The pergelic cryaquepts, very gravelly, nearly level association occupies braided flood plains, broad alluvial fan, and low terraces bordering major rivers flowing north across the coastal plain. Parent material is very gravelly alluvium. Permafrost is continuous except above escarpments where gravels drain free. Low parts are commonly flooded by runoff. Vegetation is arctic tundra.

The pergelic cryaquepts-pergelic cryorthents, very gravelly, hilly to steep association occurs southwest of the Wind River in an area of high ridges and rocky peaks. It forms mostly on bedrock colluvium. Elevations range to 5,000 feet (1,500 m). Only the lower elevations and steep south-facing slopes support white spruce. Solifluction lobes, frost boils, stone stripes and other frost features are common.

The pergelic cryaquepts-pergelic cryochrepts, very gravelly, hilly to steep association occurs in extensive highland areas on either side of the Sheenjek River, and west of the Old Crow Plain around the south end of the Davidson Mountains. Terrain is unglaciated but steep. Elevations range between 1,000 and 5,000 feet (300 to 1,500 m). At lowest elevations natural levees and steep south-facing slopes support white spruce, paper birch and aspen. Patterned ground is common at higher elevations.

The ochrepts suborder soil are drier and more freely drained than the aquepts. They are generally light brown in color with moderate amounts of organic matter in the upper few inches and a brown "cambic" horizon. This horizon gives the appearance of soil development but is mostly the result of indigenous iron rather than mineral translocation. This suborder is represented by two associations on the refuge.

The typic cryochrepts-typic cryorthents, loamy, nearly level to rolling association is found on the refuge around the Porcupine River lower ramparts, an area of calcareous loess low rolling hills. Soils are forested and well drained. Permafrost extent is not well known, but this association and the next one described are probably the only soils on the refuge that could be considered at all suitable for agriculture, construction, or other development.

The typic cryochrepts-histic pergelic cryaquepts, loamy, nearly level to rolling association occurs in the low loess-covered hills of the Yukon Flats. The Arctic Refuge portion is in the neighborhood of Coleen Mountain. Soils are generally forested, well drained, and free of permafrost above 40 inches (100 cm).

(b) Entisols

This order of soils shows little or no horizon development. There are small amounts of organic matter, a slight loss of carbonite and a slight concentration of clay. The only suborder of entisols on the refuge are

orthents. Although most entisols are continually wet, orthents have a lower water table and result from unstratified parent material (loess). Orthents are considered to be immature because they remain frozen for so much of the year. They are represented on the refuge by one association.

The pergelic cryorthents-typic cryochrepts, very gravelly, hilly to steep association covers high parts of the Porcupine Plateau [between 1,000 and 3,000 feet (300 to 900 m) and plateau summits around 3,500 feet (1,100 m)] southeast of Old Rampart, and either side of the Salmon Trout River. Parent material is limestone talus and rubble, with loess on lower slopes. Vegetation includes white spruce on steep slopes, and white spruce and cottonwood forests along rivers.

(c) Mollisols

These are generally the most highly developed soils in the region. They consist of the surface decomposition of organic matter in the presence of divalent base cations, mostly calcium, to yield a mollic (soft) horizon. The mollic horizon is usually over 7 inches (18 cm) thick, dark colored, rich in humus and high in base minerals. These soils are well granulated and soft and pliable when moist. They might be good for agricultural uses in more temperate regions, but this is prevented in the arctic by permafrost and climate. Two suborders are present. Aquolls are wet, and borolls are well drained.

The pergelic cryaquolls-histic pergelic cryaquepts, loamy, nearly level to rolling association occurs on the coastal plain in elevations from sea level to about 400 feet (120 m), or to 1,000 feet (300 m) on the few hills included in the area. This association features the patterned ground typical of arctic tundra. Most soils are loamy and calcareous.

The pergelic cryaquolls, very gravelly, nearly level to rolling-pergelic cryoborolls, very gravelly, hilly to steep association occurs in a small area bordering Gilead Creek between the Echooka and Ivishak rivers. Parent material is limestone or calcareous shaley colluvium, and drift.

The Pergelic cryoborolls-pergelic cryaquolls, very gravelly, hilly to steep association occurs along the entire north slope of the Brooks Range. Elevations range from 1,000 to 3,000 feet (300 to 900 m), but with some slopes to 4,000 feet (1,200 m). Parent material is calcareous rock residuum and colluvium.

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5 RM 20

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Exhibit 1 - Format for Documenting Compatibility Determinations

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20. Compatibility Determination

- 20.1 Purpose. This chapter provides guidance on determining the compatibility of proposed refuge uses.
- 20.2 Scope. The policy guidance provided herein shall apply to uses of units of the National Wildlife Refuge System (NWRs).
- 20.3 Policy. Use of a national wildlife refuge may not be permitted unless first determined to be compatible with the purposes for which the refuge was established. Refuge use must also be consistent with refuge objectives and applicable laws and policies.

Certain types of use (see Section 20.8F) may not be subject to a strict application of the compatibility test. In such cases, the compatibility determination process should be used to identify, and to the extent possible, avoid or minimize adverse impacts on refuge purposes.

- 20.4 Objectives.
- A. To provide refuge managers with guidelines for determining the compatibility of proposed refuge uses and a procedure for the documentation and review of such determinations.
 - B. To ensure that all refuge uses are conducted in accordance with the legal mandates for compatibility and are consistent with objectives, laws and policies.

- 20.5 Authorities.
- A. National Wildlife Refuge System Administration Act of 1966 (NWRsAA). This Act authorizes the Secretary of the Interior to permit uses of a refuge "whenever he determines that such uses are compatible with the major purposes for which such areas were established."
 - B. Refuge Recreation Act of 1962. This Act requires that any recreational use of refuge lands be compatible with the primary purposes for which a refuge was established and not inconsistent with other previously authorized operations. It places an additional restriction on those forms of recreation that are not directly related to a refuge's primary purposes by requiring that sufficient funding be available "for the development, operation, and maintenance" of these uses.
 - C. Alaska National Interest Lands Conservation Act of 1980. Section 304 of this Act adopts the compatibility standard of the NWRsAA for determining appropriate uses of Alaska refuges, and requires that uses which may be compatible on specific areas within each refuge be identified in a comprehensive conservation plan. However, this statute also provides for certain modifications, or exceptions, to the customary test of compatibility. Section 1008 requires that the "national interest" for oil and gas production on refuge lands be considered before such use is determined to be incompatible. Section 1110 mandates that access for traditional activities be allowed subject to reasonable regulations designed to protect the natural and other values of refuge lands.

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Such access may be prohibited only if, following appropriate public notice and hearing, a determination is made that it would be "detrimental to the resource values of the unit or area."

- D. Other applicable authorities. There are a number of other laws, regulations and Executive Orders, some of which are listed below, that should be considered prior to approving a use of refuge lands. Refer to 1 RM 5 for a more detailed listing of the authorities affecting the administration of the NWRS.

- (1) Endangered Species Act of 1973.
- (2) Wilderness Act of 1964 and refuge-specific wilderness legislation.
- (3) Migratory Bird Treaty Act of 1918.
- (4) National Historic Preservation Act of 1966.
- (5) National Environmental Policy Act of 1969.
- (6) Title 50 of the Code of Federal Regulations, Subchapter C.
- (7) Executive Order 11593 (1971) - Protection of cultural resources.
- (8) Executive Order 11988 (1977) - Floodplain management.
- (9) Executive Order 11990 (1977) - Protection of wetlands.

20.6 Definitions.

- A. Compatibility. A use may be determined to be compatible if it will not materially interfere with or detract from the purpose(s) for which the refuge was established. Some compatible uses may be supportive of refuge purposes, while others may be of a nonconflicting nature.
- B. Reserved Rights. For the purposes of this chapter, reserved rights shall mean non-federally held rights to the use of resources located within a refuge. These may include rights to minerals, timber and other economic resources, or to nonconsumptive uses such as access.

20.7 Responsibilities.A. Director.

- (1) Provides national policy guidance on procedures to be followed in making determinations of compatibility, to ensure that such determinations are in compliance with all applicable authorities.
- (2) Reviews those compatibility determinations involving:
 - a. The opening of refuges to hunting, fishing or other public use.
 - b. Appeals filed in accordance with 50 CFR 29.22 (rights-of-way).

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B. Regional director.

- (1) Ensures that refuge managers adhere to law and policy when making compatibility determinations.
- (2) Reviews determinations of refuge managers in following instances:
 - a. The opening of refuges to hunting, fishing or other public use.
 - b. Appeals filed in accordance with 50 CFR 25.45 (refuge permits).
 - c. When compatibility determination accompanies another document subject to regional review, such as management plans or environmental assessments.
 - d. Whenever deemed appropriate by regional office or refuge manager.

C. Refuge manager.

- (1) Determines the compatibility of proposed uses in a site-specific manner.
- (2) Complies with all applicable laws, policies and guidance when permitting any refuge use.
- (3) Periodically reviews ongoing refuge uses to ensure continued adherence to the policy stated in Section 20.3 of this chapter.
- (4) Documents decisions regarding compatibility as required by Section 20.9 of this chapter or when otherwise deemed necessary.
- (5) Obtains the regional director's concurrence on compatibility determinations when required by Section 20.10 of this chapter, regional policy, or as may be necessary.

20.8 Determination of compatibility. Diversity of wildlife species, habitats and purposes of the many refuge units precludes any attempt at compiling a standardized delineation of compatible versus incompatible uses. Determination of compatibility must be based upon a site-specific biological analysis of anticipated impacts of a particular action in terms of the resources (generally wildlife populations and habitats) which represent the purposes for which a refuge was established. This analysis is made on a case-by-case basis by the refuge manager with regional and Washington Office review where warranted. On many refuges, such decisions are made daily, often with little thought of the underlying legal mandates. In many of the routine day-to-day decisions, the facts are relatively clear-cut and the process therefore quick and simple. However, managers are frequently faced with situations involving uses of a complex or unfamiliar nature which require thorough analysis before a compatibility determination can be made.

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These are the types of situations where a manager's decision regarding the compatibility of a proposed use may be challenged, or the method of arriving at such a decision questioned. It is important that all determinations be supported by sound justification and, where necessary (see Section 20.9), documented.

The following guidelines provide a procedure for reviewing all proposed uses for compatibility. Adherence to this procedure by all concerned will help ensure a consistent application of the compatibility standard on all NWRS lands.

- A. Identifying refuge purposes. The purposes for which a refuge was established are those identified in that refuge's authorizing document. This may be an Executive or Public Land Order, special legislation, or other form of land acquisition document. This documentation should be on hand in the refuge files. Refuge managers unable to locate this material or having other difficulties in ascertaining refuge purposes, should contact their supervisors for assistance from the regional realty office.

The authority under which a particular refuge was established may also aid in identifying that refuge's intended purposes. For example, a refuge established under the Migratory Bird Conservation Act would obviously have been intended for use by migratory birds. However, the actual type of birds and use (i.e., waterfowl vs. shorebirds and wintering vs. nesting) that make up the refuge purpose could not be determined without further details. Refer to 3 RM 1 for more information on the establishment of refuges.

Refuge purposes may range from the very specific goal of preserving and managing the habitat of a single species, as at Columbian White-tailed Deer NWR, to the much broader purposes of the Kenai NWR which include conserving natural diversity, fulfilling international treaty obligations, ensuring water quality and quantity, and providing opportunities for scientific research and public use.

Although some refuge objectives are derived directly from the stated refuge purposes, others may bear little relation to such purposes. For that reason, refuge objectives must not be used as the basis for determining compatibility. However, as described in Section 20.11, an awareness of refuge objectives is still essential in deciding whether a particular use should be permitted.

- B. Describing proposed use. To adequately assess the impacts of a proposed action, sufficient details must be available regarding the nature of that action. When a request is made for the use of refuge lands, the party making that request should be required to provide all of the necessary information. The following questions should be answered.

(1) What is the use? Describe fully the use planned.

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- (2) Where will it be conducted? Specify the areas of the refuge to be utilized, including those needed for incidental purposes such as access and storage.
- (3) When will it be conducted? Be specific as to both season and time of day. Also indicate the anticipated duration of the use.
- (4) How will it be conducted? Describe the techniques to be utilized and the types of equipment and/or number of people involved.
- (5) Why will it be conducted? List the specific reasons for the proposed use and its desired objectives. Also, justify the need to conduct the use on refuge lands. Although this information may not be necessary for determining potential impacts, it could be useful in identifying alternative methods of accomplishing the same goals.

- C. Assessing impact of use on refuge purposes. In reviewing a proposed use for compatibility, the refuge manager should consider the impacts such an action would have on the refuge purposes. For some refuges, broad determinations of compatibility may already have been made for general categories of use through the formal planning process. Where current master plans or comprehensive conservation plans (Alaska refuges) exist, it can be assumed that the uses and activities described as being generally suitable for implementation may be compatible with refuge purposes. However, before a definitive finding of compatibility may be made for a particular use, the specific details of that use must be considered. Refuge management plans provide a further refinement of the data needed to determine compatibility by considering the temporal and spatial requirements of certain uses. A review of these planning instruments is therefore a good starting point in this decisionmaking process.

Direct impacts on refuge resources, such as disturbance of wildlife or destruction of habitat, may be fairly easy to predict. However, care must be exercised to avoid overlooking the less obvious indirect or cumulative effects that may be associated with a particular use. For example, an action with no direct impact on refuge purposes could still interfere with the achievement of those purposes indirectly by diverting funding or personnel from an existing management program. Likewise, a use with little or no potential for impact on its own may contribute to the cumulative impact on refuge resources when conducted in conjunction with, or following, other uses.

Refuge managers should also be careful to distinguish between long and short-term impacts, since such a distinction could influence the determination of compatibility. An activity that results in the relatively short-term effect of removing vegetation until the next growing season might be considered compatible, while a similar activity that results in a long-term loss of vegetation due to soil compaction may not. Impacts

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of a permanent or irreversible nature, if any, would be included in the long-term category.

In assessing the potential impacts of proposed refuge uses, refuge managers should utilize all available tools. These may include the planning documents previously mentioned, information from previously conducted or ongoing research, data from refuge inventories or studies, and earlier documented compatibility determinations for a similar use. Existing environmental assessments or impact statements regarding the type of use being considered may also be extremely helpful. In fact, where refuge purposes are very broad, as is the case for all of the Alaska refuges, such environmental analyses may occasionally be needed to adequately evaluate the impacts of certain uses. As a general rule, however, the determination of compatibility should not be tied to compliance with the requirements of the National Environmental Policy Act (see 4 RM 5), since that Act calls for a more comprehensive evaluation of an action's impacts than is normally required to assess compatibility.

- D. Designing stipulations. Many uses that appear to be incompatible as originally proposed, may be made compatible through modifications that serve to avoid or minimize anticipated adverse impacts. Refuge managers should keep this in mind while reviewing a proposal and inform the applicant of any changes that may be necessary. Protective stipulations included in the permit authorizing a particular use should specify the manner in which that use must be performed to ensure compatibility. Stipulations might identify where a use is permitted, the times of year and day during which it could be safely conducted, the routes or forms of access to be used and any restrictions on the types of equipment to be utilized or number of people to be involved. Monitoring of the use must be sufficient to ensure compliance with these conditions and swift action must be taken to correct any serious deviations.

In instances where the granting of a right-of-way across refuge lands will result in a permanent or long-term loss of habitat, the regional director may require mitigation, as authorized by 50 CFR 29.21-7, to make that action compatible. Such mitigation may involve creation or enhancement of similar habitat on the refuge, or the acquisition of suitable replacement land contiguous to, or in the immediate vicinity of, the refuge. However, the use of off-site mitigation to ensure compatibility is not generally deemed appropriate for refuge uses other than rights-of-way.

- E. Making determination. After completion of the steps described, the refuge manager should be able to declare the proposed use to be either compatible or incompatible and to list any stipulations that may be required to ensure compatibility. This decision must be supported by adequate justification.

It should be remembered that the compatibility determination process is merely a preliminary screening of a proposed use to assess its adherence

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to the legal mandates of compatibility. Further evaluation of the proposal is required, as described in Section 20.11, before the use may be allowed to occur.

Where the issuance of a permit is required, the guidance in 5 RM 17 should be followed. That chapter also specifies the procedures for recovering costs associated with this review process, as mandated by Department policy.

- F. Constraints. There are a number of circumstances under which the usual legal and policy requirements of compatibility may not be applicable. The most common of these management constraints involves property rights which are not vested in the Federal government, such as reserved rights to explore for and develop oil and gas beneath a refuge. Since such an operation would involve use, and possibly disturbance, of refuge-owned surface resources, refuge purposes may be impacted. The compatibility determination process as outlined above could be useful in identifying and avoiding or minimizing these impacts and should be used for that purpose. However, a determination that a use associated with a reserved right is not compatible may be irrelevant, since the holder of reserved rights must be afforded reasonable access to those rights. Prohibition of such use on the basis of incompatibility could amount to an illegal taking of an individual's property. Communication and cooperation between the refuge manager and the holders of reserved rights is often the surest and easiest way to protect refuge resources without infringing upon the exercise of valid privately held rights. The regional realty and solicitor's offices should be consulted for advice in dealing with this type of situation.

Other possible constraints on the application of the compatibility standard include:

- (1) Legal mandates which supersede those requiring compatibility.
- (2) Water rights.
- (3) Rights or privileges imparted by treaty or other legally binding agreement.
- (4) Primary jurisdiction of refuge under an agency other than the FWS.

20.9 Documentation.

- A. Compatibility determinations should be documented in writing under the following circumstances:
- (1) Whenever the proposed use requires the preparation of another document, such as an environmental assessment or a refuge management plan. The documentation of compatibility would not, however, be required solely on the basis of the issuance of a refuge permit.

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- (2) Whenever the refuge manager feels it is necessary.
- B. Documentation of compatibility determinations must include, at a minimum, the following information:
- (1) The station name, establishing authority and date established.
 - (2) The purposes for which established, as stated in the establishing document.
 - (3) A brief description of the use being evaluated and its anticipated impacts on refuge purposes.
 - (4) A statement as to whether the proposed use was determined to be compatible, including an adequate justification of this decision and a brief description of any required protective stipulations.
 - (5) The name, title and signature of the preparer and the date prepared.

Although use of the format shown in Exhibit 1 is not mandatory, it is recommended that this form be duplicated and used for documenting all future compatibility determinations.

20.10 Review.

- A. Refuge managers should submit documented compatibility determinations to the regional director for review and concurrence in the following instances:
- (1) Whenever the submission of another document, regarding the proposed use, is required. However, regional review of refuge permits would not, in itself, necessitate the submission of documented compatibility determinations.
 - (2) Whenever the proposal involves opening a refuge to hunting, fishing or other public use.
 - (3) Whenever an applicant for a Special Use Permit appeals the refuge manager's denial of such a permit on the basis of compatibility.
 - (4) Whenever deemed necessary or appropriate by the regional office or refuge manager.

20.11 Further evaluation of compatible uses. A positive determination of compatibility should not be viewed as the final word on whether a particular use will be permitted. The proposal must still be evaluated in terms of various other factors, such as those described below. Occasionally, a proposed use will be in such clear violation of law or policy that a determination of

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compatibility would be meaningless and therefore may be omitted. Generally, however, a finding of compatibility would precede these other considerations.

- A. Compliance with Federal and State laws and other applicable authorities.
- B. Adherence to policies of the Service and Department as set forth in the Refuge, Administrative, and Departmental Manuals and other forms of policy guidance.
- C. Consistency with refuge and NWRS objectives (see 2 RM 1). A review of the planning documents described in Section 20.8C will assist in the identification of refuge objectives and their relationship to a proposed use (see 4 RM 1 and 4 RM 3).
- D. Relationship to station funding and personnel levels.
- E. Although the wide divergence of personal views makes it impossible to base all refuge management decisions on a consensus of public opinion, it is Service policy to consider such input whenever practicable.

APPENDIX P. Fish and Wildlife Service Regional Policy on Mechanical Manipulation in Minimal Management Areas.

The following letter was the result of coordination efforts between the Alaska Department of Fish and Game and the Fish and Wildlife Service regarding the process by which a final Plan could be revised.

Don W. Collinsworth, Commissioner
Alaska Department of Fish and Game
1255 West 8th Office
P.O. Box 3-2000
Juneau, Alaska 99811

Dear Commissioner Collinsworth:

At recent meetings with members of your staff to discuss various aspects of the comprehensive conservation plans, it was apparent that there is a misunderstanding about the process for modification of a completed plan. This was discussed in relation to mechanical manipulation under the minimal management category where it states, "May be considered subject to appropriate plan revision."

The Service position is that when there is an instance during the life of a plan where it is mutually agreed that mechanical manipulation or other large scale management action is necessary this process would be followed:

- o The action would require National Environmental Policy Act compliance (this means the Service would have to do, at a minimum, an environmental assessment).
- o If a full Environmental Impact Statement was necessary, we would do one.
- o Either way, public participation is necessary. If an Environmental Impact Statement was needed, the preferred alternative would assess the impact of the operation and redesignate the area to be impacted to a management category that would accommodate such activities.
- o If after public participation only an Environmental Impact Analysis was needed, the Service would advise the public that:
 - the area where the management activity was to occur was being changed to a management category that would permit it; and
 - the Service was proceeding with the management activity.
- o This action would be appended to the individual plan, and when a major revision of the plan was executed it would adequately incorporate the management activity.

This process is available to the Department of Fish and Game through our joint fish and wildlife management responsibilities as reflected in the Memorandum of Understanding and 43 Code of Federal Regulations 24.

Sincerely,

Regional Director

APPENDIX Q. Selected Written Comments on the Draft Arctic Refuge Comprehensive Conservation Plan/Environmental Impact Statement, and Fish and Wildlife Service Responses.

The Service received 961 letters commenting on the draft plan. These comments were considered by the Service in preparing the final refuge comprehensive conservation plan. Forty-seven of the letters are printed below, with Service responses to selected comments. Thirteen of the letters are included in this appendix as representative of the other 914 responses the Service received. All of the letters are on file at the Fish and Wildlife Service's regional office in Anchorage.

SELECTED CORRESPONDENCE

Federal Agencies

Department of the Interior
Bureau of Mines
U.S. Environmental Protection Agency

State of Alaska

Citizens' Advisory Commission on Federal Areas
Office of the Governor, State Conservation System Unit Coordinator

Local Governments

Arctic Village

Associations and Organizations

Alaska Center for the Environment
Alaska Friends of the Earth
Alaska Heritage Research Group, Inc.
Alaska Oil and Gas Association
The Alaska Wildlife Alliance
American Wilderness Alliance
Beauty Without Cruelty USA
International Porcupine Caribou Commission
National Audubon Society
National Wildlife Federation
National Wildlife Refuge Association
Northern Alaska Environmental Center
Resource Development Council for Alaska, Inc.
Sierra Club, Alaska Chapter
Tanana Chiefs Conference, Inc.
Trustees for Alaska
The Wilderness Society
Wildlife Federation of Alaska

Individuals and Industry

Judy Alderson
ARCO Alaska, Inc.
Robert Bacon
Dianna Brown
Thomas J. Classen
Vicki Finn
Bruce C. Forbes
Dr. Paul E. Turner
Greg Warren
Harry Wassink
Heather Whitaker

Representative Letters

Sylvia A. Altman
Ann M. Curtis
Alison L. Hedberg
Heather Koon
Daniel Kruse
Kim McCutcheon
Steve and Rose Lee
Johanna D. Moore and Nigel H. Goddard
Sarah Muckerman
Lisa Petersen, Esq.
Larry Rice and Judy Bradford
Christopher and Pamela Scranton
Bill Violet



United States Department of the Interior

BUREAU OF MINES
Alaska Field Operations Center
201 E. 9th Avenue
Suite 101
Anchorage, Alaska 99501

February 3, 1988

Regional Director
Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503
ATTENTION: William Knauer

RE: Draft Arctic National Wildlife
Refuge CC/EIS/WR/WRP

Dear Mr. Knauer:

Thank you for the opportunity to review the above document. Most of the comments included below are those of James Barker, Supervisory Physical Scientist at our Fairbanks Office, who has had considerable field experience over the years in the lands now included in ANWR.

The Draft EIS places very little emphasis on nonfuel mineral resources, yet the 20 million acres included within this region contains some of the most highly mineralized areas in Alaska. For instance, on p. 70, only two sentences describe the Bear Mtn. W-Mo porphyry, yet in reality this deposit is likely the United State's single largest tungsten resource.

The Bureau of Mines reaffirms the need to permit continued geological and resource studies. This agency, for example, is continuing and actively involved with mineral assessment of certain strategic metals in the Porcupine/Old Crow area. There is a tendency on the part of USFWS to make permits too restrictive (p. 269). Not all field studies can be based out of Ft. Yukon. For various reasons including safety, often more than one or two geologists are involved. Not all work is helicopter supported. Generally Bureau work requires more than a "few hours at a site," (p. 282). Sometimes a few weeks or more are required. Shallow drill coring during December through April is impractical (p. 290).

The future needs for sand and gravel are not well-addressed. The eventual development of the coastal plain will require enormous quantities. No projections of use or availability are mentioned, although permits with stipulations are to be available. If stipulations are too restrictive, the industry will seek alternative sources offshore, resulting in marine impacts that are also not projected (p. 273).

Development of the nine existing mining claims is unlikely under any of the alternatives given the severe, restrictive, and unpredictable nature of USFWS regulations. It is unlikely claim owners could justify the risk of investment.

Mineral resources (p. 65-71) are only vaguely known due to the historical lack of exploration in this region. However, the Draft EIS omits several important items:

- *1. Bear mountain as mentioned above, also contains Nb, and W occurrences in placers. See Bureau OFR 8-85.
- 2. There is potential for W-Mo at Ammerman Mountain to the east of Bear Mountain.
- *3. The Old Crow Batholith was described in much more detail than acknowledged. See Bureau OFR 27-81, DGGs Report No. 73 (1982). The batholith is host to U-lodes and Sn-REE-Y-W-Nb placers. Mineralogy was given despite the statement to the contrary. Cu-Zn-Ag skarns also occur and Sn-greisens are likely. Reference to the area on Fig. 6 is wrong (copy attached).
- *4. There is no mention of the potentially extensive coal resources in the Coleen/Porcupine area. See Bureau OFR 14-81 and MIRL Rept. 72.
- 5. Devonian Volcanics p. 69, contain Co in conjunction with the Cu deposits.
- *6. The Christian Complex shown for Ba, Cu (fig. 6, P. 66) also is favorable for Au, there are known occurrences.
- 7. There are also several DOE reports that provide mineral information on the region, but were omitted - GJBX-33(80); C.C. Hawley contract study, ref. no. not available.

*Reference not cited, include DGGs. No. 73 (1982), MIRL No. 72 (1987), Bureau OFR's 37-81, 14-81, 69-81, 8-85 (index of Bureau publications enclosed).

Robert B. Hoekzema
Robert B. Hoekzema
Chief, Anchorage Branch

Attachment

RBH:cto

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Responses to the Bureau of Mines

1. We have revised the draft plan to acknowledge the presence of this deposit.
2. Comment noted. The Service acknowledged in the "common management directions" on page 207 that under Section 1010 of the Alaska Lands Act all Federal lands in Alaska be assessed for their mineral potential. The Service will issue permits to the Bureau of Mines with reasonable requirements to protect the resources of the refuge, as provided for under Section 1010. The examples cited in the comment are included as a hypothetical mining development of an existing claim, for analysis purposes. We recognize that the the Bureau's mining assessment work would differ from the scenario included here.
3. This document did not address development of the 1002 coastal plain area, as cited in several places in the draft plan (see the "Notice to the Reader" in the front of the document, and page 262). In this document the Service assumed the coastal plain would continue to be managed as a minimal management area. As noted in Table 9, sand and gravel removal is not permitted under this category. The 1002(h) report discusses sand and gravel requirements for oil development on the coastal plain, and the resulting potential impacts to refuge resources.
4. Comment noted. We do not believe that the draft plan includes any mining restrictions that are "severe, restrictive and unpredictable." Indeed, the Service has no authority to take any actions that affect the operations of claim or patent holders within the refuge. Again, the mining scenario included in Alternatives B through G are a hypothetical case, included only for analytical purposes. The scenario was for a typical placer mine based on information provided by the Bureau of Land Management (see page 288 of the draft plan).
5. The text and figure have been revised to include the information you provided.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 5TH AVENUE
SEATTLE WASHINGTON 98101



EPA-10
270-10 WD-136

MAY 10 1977

Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
7011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Stieglitz:

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS)/Comprehensive Conservation Plan (CCP)/Wilderness Review/Wild River Plan prepared by the Fish and Wildlife Service (FWS) for the Arctic National Wildlife Refuge (ANWR). This document evaluates seven alternatives for managing the 19.5 million-acre ANWR. The Legislative EIS/Report to Congress on the 1002 coastal plain area in ANWR has already evaluated management plans for that subarea of the refuge. The Congressional decision on management of the 1002 area will be incorporated into this plan in the future.

Our review was conducted in accordance with the National Environmental Policy Act and our responsibilities under Section 309 of the Clean Air Act. Our major concerns are summarized below and discussed in more detail in our enclosed Detailed Review Comments.

Based on our review, we are rating the ANWR DEIS/CCP preferred alternative EC-2 (Environmental Concerns - Insufficient Information). An explanation of the EPA rating system for Draft EISs is enclosed for your reference. This rating and a summary of our comments will be published in the Federal Register.

Our environmental concerns are based on several factors. First, the sensitive nature of the arctic and subarctic ecosystem, the long timeframe for recovery from adverse effects, and the lack of detailed information about the biological populations and communities within the refuge will require that extensive information be gathered and careful monitoring of activities be conducted. Gathering data and monitoring activities will require increases in funding and staff levels. The Alaska Department of Fish and Game will play a significant role in implementing any of the alternatives due to its involvement in gathering information and monitoring use levels. The DEIS provides no discussion of how CCP implementation might change if federal and state funding are less than required. Second, the impacts to threatened and endangered species are not evaluated as a separate resource category. Finally, since there is some uncertainty about what future activities will be

U.S. ENVIRONMENTAL PROTECTION AGENCY
Detailed Review Comments
Arctic National Wildlife Refuge DEIS/CCP

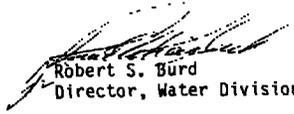
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allowed under the preferred alternative (based on the Congressional 1003 decision) the Final EIS (FEIS) needs to commit to a NEPA public review process if major changes to the CCP are considered during periodic review in the future.

Additional information about several subject areas is needed. Impact definitions for a variety of resource categories should be developed. Separate impact definitions for threatened and endangered species, that reflect their sensitive and vulnerable status, are warranted. Clarification on the application of the definition of major impacts is needed. A discussion of the funding process and contingency plans for CCP implementation if funding levels are inadequate would provide useful information. The FEIS should also discuss whether the data gaps in the refuge information base have a bearing on the evaluation of impacts and the selection of a preferred alternative.

Thank you for the opportunity to provide these comments. If you have any questions about our review comments, please contact Sally Brough in our Environmental Review Section at (206) 442-4012 or (FTS) 399-4012. We look forward to reviewing the Final EIS.

Sincerely,


Robert S. Burd
Director, Water Division

Enclosure

INTRODUCTION:

As noted in our transmittal letter we have several concerns about the proposed action. Several discussions in the DEIS could be clarified, revised, and expanded in order to strengthen the document and provide the public with a clearer picture of the environmental consequences of the proposed action and the opportunities for future public involvement. A detailed discussion of our concerns and recommended changes for the FEIS are presented in the following review comments.

IMPACT DEFINITIONS:

The DEIS provides definitions of impact significance (pg. 263) for fish and wildlife resources. These definitions are important information that provide the basis for the relative comparison of impacts among alternatives. However, the FEIS should also provide impact definitions for water quality and quantity, air quality, ecosystems, population, economy, subsistence, recreation, cultural resources, and threatened and endangered species. It is difficult to understand impact conclusions for the subheadings listed above when the impact categories are not defined in any kind of a temporal or spatial context.

We suggest that the definitions of degrees of impact for water quality should be similar to those in the Selawik National Wildlife Refuge FEIS/CCP. This is appropriate, given that maintenance of water quality and quantity is a specific refuge purpose under the Alaska National Interest Lands Conservation Act. The definition of "major impact" for water quality should include exceedance of Alaska water quality standards.

We also suggest an expanded set of definitions for short-term and long-term impacts by resource type (e.g., wildlife, fish, water quality, and air quality). The proposed definition (short term = less than five years for all resources except fish) is not universally appropriate. For water quality specifically, the definition of "short-term impact" should be worded to be consistent with the State of Alaska Water Quality Standards. These standards describe short-term impacts as generally existing during the course of specific activities which are held to the shortest practicable period of time (e.g., days to weeks).

The FEIS should provide separate impact definitions for threatened and endangered species (described on pgs. 123-124). Using the same impact definitions for these species as for the rest of the biological resources would not appear to be an appropriately conservative approach. Endangered populations are low in abundance (the basic reason for their threatened or endangered status) and they are often vulnerable and less resilient to impacts. The vulnerability of these populations should be reflected in separate impact definitions.

Finally, we are concerned about an apparent discrepancy in the application of the major impact definition to several fish and wildlife resources. In several instances (pgs. 295, 296, 299) the environmental consequences discussion in the DEIS concludes that local impacts will be major but regionally the impacts will be moderate/minor. In other words, major impacts to local populations are downgraded when put into a regional context.

The definition for major impacts to fish and wildlife resources does not provide a basis for downgrading the impact if the effected population is a local population rather than a regional population. If the impact "causes a change in abundance or a change in distribution beyond which natural recruitment would not likely return that population to

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its former level within several generations," it is a major impact. Population, in this definition, means a regional or a local population of a species. The definition appears to equate regional and local populations if abundance or distribution changes lasting several generations occur. The FEIS should either correct the impact conclusions or clarify the definition.

OPERATION AND MAINTENANCE COSTS:

We are concerned that all the alternatives require additional funding and staff level increases in order to fully implement the management directives encompassed by each alternative. The FEIS should briefly describe the funding process and, if possible, the feasibility of obtaining the required increase in funding. Is adequate funding assured once a preferred alternative is selected and a Record of Decision is signed?

More importantly, how will refuge management activities be carried out if there is less than full funding or if the required increase in funding is phased in over several years? Management of the refuge involves a variety of activities including: data collection; research; monitoring; cooperation with state agencies for the management of resident wildlife; completion of management plans; and education programs. The preferred alternative will require an 80% increase in funding. If there is a significant funding shortfall, will all management activities be cut back equally? Does the FWS believe that some management activities have a higher priority for completion than others? The FEIS should present contingency plans that describe how the preferred alternative will be implemented in the event that funding is inadequate.

COOPERATION AND COORDINATION WITH OTHER GOVERNMENT AGENCIES:

Throughout the DEIS, cooperation with other government agencies is presented as an integral part of the management of the refuge. Specifically, the Alaska Department of Fish and Game (ADFG) and the FWS will cooperatively manage the fish and wildlife resources of the refuge. We fully support a cooperative and well coordinated management approach among federal and state agencies. ADFG's role in the implementation of all of the alternatives is significant. ADFG will, in conjunction with FWS, undertake studies to improve the refuge wildlife data base (p. 186), limit harvests or restrict specific uses (p. 278), monitor use levels to ensure that opportunities for subsistence harvests are maintained (p. 309) and that adverse impacts to subsistence harvest are not significant.

The Memorandum of Understanding (MOU) between ADFG and FWS, in Appendix II, describes the "general policy guidelines within which the two agencies agree to operate" (p. 448). We encourage timely resolution of differences in legal mandates, objectives, policies, and regulations as mentioned in the MOU.

The MOU and DEIS do not describe how the CCP will be implemented if ADFG does not have adequate funding, if effectively undertake studies, monitor use, or limit or restrict uses. The FEIS should briefly discuss how reduced ADFG activity will affect CCP implementation. This could be discussed as part of the contingency plans mentioned in the discussion under the previous subheading.

THREATENED AND ENDANGERED SPECIES:

The DEIS identifies a moderate localized effect on refuge raptors and a minor impact refuge wide. Of particular concern is the endangered American peregrine falcon, which nests in cliffs along the Porcupine River. Evaluating the impact significance of the alternatives on threatened and endangered peregrine falcons within a context of regional raptor populations is not appropriate. Additionally, the American peregrine falcon is found predominantly in the Porcupine River area. Thus the local population of this endangered species could represent the regional population, or a major portion of it.

The potential environmental consequences of the proposed action on threatened and endangered species should be evaluated separately rather than lumping these sensitive species in with similar groups of biological populations found in the refuge. Impact conclusions for this species for each alternative should be highlighted and located under a Threatened and Endangered Species resource category in the FEIS. A separate resource category would be appropriate if separate impact definitions are developed.

The DEIS states (p. 272) that disturbance of eagles' nests and falcon nesting cliffs would be prevented if people avoid these areas during early summer. Minor impacts would likely result from increased recreational use if people avoid the area. How will human avoidance of these areas be implemented? The FEIS should describe whether there are ways to prevent human intrusion. If avoidance can't be adequately regulated and human intrusion is likely, the impact conclusion should be changed to reflect human disturbance of these species.

DATA GAPS:

The DEIS acknowledges that "in arctic and subarctic environments problems may easily develop from a lower level of human use than that which would cause problems in more temperate regions" (p. 28). Plant and animal communities have been able to adapt to the harsh environment in the refuge, but the short growing seasons and slow rates of growth could significantly affect their recovery from and adaptation to disturbances. Thus, we are dealing with sensitive ecosystems that are more susceptible to human activities. Our concern about the sensitive nature of the refuge's arctic and subarctic ecosystems is compounded by the lack of detailed information about the biological communities within the refuge.

The DEIS identifies several specific types of data gaps. They include the following general categories: poorly documented distribution of many species; little information on critical habitat requirements for a variety of populations; unknown migration patterns and seasonal movement of some species; the need for additional documentation of raptor nesting; unknown population dynamics of some biological resources; unknown subsistence harvest levels of many species; the lack of reliable public use data; and uncertainty about the numbers of consumptive and nonconsumptive users visiting the refuge.

The DEIS also points out that much of the existing information on refuge resources is for the coastal plain. Additional information is needed on the resources south of the 1002 area and south of the Brooks Range. The coastal plain and the area north of the Brooks Range represent a small proportion of the total acreage of the refuge (approximately 20 percent).

The DEIS does an excellent job of acknowledging the data gaps and uncertainties in the information base for each individual resource category as required by Section 1502.22 of the Council on Environmental Quality Regulations for implementing NEPA. However, due to the limitations in the data base, great care should be used in selecting an alternative that will provide adequate protection to the sensitive ecosystems in the refuge for which few detailed data exist. The FEIS should provide some discussion of the relevance of the incomplete data and limited data base to the evaluation of impacts and the selection of a preferred alternative.

ALTERNATIVES CONSIDERED:

The CCP/EIS develops broad policy guidance for managing ANWR for the next 10 to 15 years. The CCP may be changed when the plan is periodically reviewed every three to five years. The DEIS states that public meetings may be held and environmental assessment/EIS may be necessary if major changes are proposed (p. xiii).

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Alternatives B and C would provide opportunities of economic uses, assuming Congressional authorization of economic activities. No additional refuge lands would be proposed for wilderness designation. Alternatives B and C could lead to serious adverse impacts including:

- restrictions to subsistence uses of refuge resources,
- long-term water quality degradation, and
- adverse effects on fish and wildlife species.

Alternatives D, E, and F represent a progression of increasing percentages of nonwilderness refuge lands being proposed for wilderness designation (46%, 77%, and 86%, respectively). Alternative G is identical to Alternative F, except for additional public use restrictions. Wilderness designation would guarantee long-term protection of the resources in the refuge through Congressional designation of wilderness. Wilderness designation would establish the future uses that would be allowed. Economic uses and development could only occur if Congress acted to change the wilderness designation.

The preferred alternative (Alternative A) would propose no new land for wilderness designation and would manage nonwilderness lands under the minimal management category. The emphasis of management under this category is to maintain the existing conditions of high value fish and wildlife habitat. FWS would "focus its efforts primarily on management studies and survey/inventory programs" to expand the refuge resource data base. However, it would also maintain maximum flexibility for a variety of uses, in the future, for the nonwilderness lands. Uncertainty exists about what future activities will be allowed on the refuge (pending the Congressional decision in accordance with Section 1003 of ANILCA). Additionally, the sensitive nature of the arctic and subarctic ecosystems in the refuge and the numerous significant data gaps warrant careful long term planning for protection of refuge resources. For this alternative, the FEIS needs to describe what constitutes a "major" change to the CCP and commit to public meetings and preparation of a NEPA document if major changes to the CCP are considered.

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1. Comment noted. We have included in the final plan definitions of degrees of impact for water quality as you recommended.
2. Comment noted. We have expanded the definitions in the final plan to address water quality.
3. Comment noted. Although we recognize that the significance of an impact on a threatened or endangered species would differ from other species, we do not believe a separate definition is needed in this document.
4. Comment noted. As we stated on page 262 of the draft plan, because of the general nature of the assessment and the lack of quantitative data regarding refuge resources, impacts are expressed in relative terms. The definitions provided in the text are general. We recognize that an action can have a major impact on either a local or a regional population. In the assessment we wanted to distinguish actions that have a major site-specific impact (but little effect on the overall refuge) from actions that have a refuge-wide impact. It was not our intent to downgrade the level of impact in the text.
5. Comment noted. The draft plan notes on page 12 that implementation of the plan will depend upon the availability of funds and personnel. These factors will determine the extent of development, management and maintenance the refuge receives in any given year. We believe it is beyond the scope of the comprehensive conservation plan to discuss the funding process and contingency plans for implementation of the refuge plan if funding levels are inadequate--it is not possible for us in this document to anticipate state and federal funding over the next 10 to 15 years, or what changes may be required in implementation of the plan if funds are less than those required. The Service's detailed annual work plan advices will address this question.
6. See response #5.
7. For each alternative in the "Environmental Consequences" chapter in the final plan we have added a new section that addresses impacts to threatened and endangered species.

With regards to floaters on the Porcupine River, the Service can require guided groups (which require special use permits) to take their trips later in the summer when they would not affect the raptors. The Service also could encourage unguided groups to take their trips at other times. The scenario projects 10 unguided groups to use the Porcupine River (page 267 of the draft). Even if all these groups floated the river in early summer (which is unlikely), this low level of use would be expected to have a negligible effect on raptor nesting (provided they did not climb up the river cliffs).

STATE OF ALASKA

OFFICE OF THE GOVERNOR

DIVISION OF GOVERNMENTAL COORDINATION

STEVE COWPER, GOVERNOR

STATE CSU COORDINATOR
2800 DENALI STREET, SUITE 700
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PHONE: (907) 274-3528

8. Comment noted. We agree that with the limitations in the data base, care should be taken in selecting an alternative that provides adequate protection to the refuge's sensitive ecosystems. We believe the preferred alternative will conserve the refuge's fish and wildlife populations and habitats, as mandated under Section 303 of the Alaska Lands Act. See also response #1 to Trustees for Alaska.
9. The draft plan states on page 14 that if a major change is proposed in the management of the refuge, public meetings may be held or new environmental assessments/environmental impact statements may be necessary. We have expanded this discussion in the final plan, noting that this process would be subject to the requirements of the National Environmental Policy Act. We also have added a paragraph that addresses changes in the plan that may be needed if and when Congress takes action on management of the "1002" area.

Modifying the management categories (e.g., changing management of an area from minimal management to intensive management) or modifying what uses would be permitted or prohibited within a given management category are examples of major changes to the plan that would require the Service to hold public meetings and prepare National Environmental Policy Act documents. We have added these examples to the text under "Implementation and Revision of the Comprehensive Conservation Plan" in the final plan.

April 25, 1988

Mr. Walter Stieglitz
Regional Director
U. S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Mr. Stieglitz:

The State of Alaska has reviewed the draft Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (CCP) for the Arctic National Wildlife Refuge (ANWR). This letter is submitted on behalf of state agencies and represents a consolidation of agency concerns and comments.

ALASKA COASTAL MANAGEMENT PROGRAM

The state has completed an advisory consistency review of the draft ANWR CCP. Based on the information presented in the draft document, it appears that the plan will be consistent with the Alaska Coastal Management Program. A conclusive review of the U. S. Fish and Wildlife Service (FWS) determination will be made after the final CCP has been issued for public review.

RANGE OF ALTERNATIVES

The state commends the FWS for the broad range of management alternatives presented in the CCP. Other recent CCPs have presented a considerably narrower range. In addition, the state wishes to express its support for the Preferred Alternative (Alternative A). Alternative "A" represents a reasonable balance between the protection of refuge resources and the opportunity to consider more intensive uses of the refuge in the future.

REVISION OF THE CCP

Page 179 - The state requests that the CCP clearly acknowledge the possible need for major revision of the CCP following congressional action on management of the "1002" coastal plain area. Management of the "1002" area may have significant bearing on management of the rest of the refuge (e.g., on the need for transportation and utility corridors; facilities siting; air and water quality; subsistence activities; fish and wildlife management; and public use of the non-1002 portions of the refuge.)

CABINS

Page 30, Paragraph 1 - We suggest revising the first sentence as follows: "The use of cabins by local residents is allowed ... for trapping, subsistence, and other traditional activities," consistent with Section 1303(b) of the Alaska National Interest Lands Conservation Act (ANILCA).

Page 172, Subsistence Activities - We suggest substituting the term "traditional" for "subsistence" and adding "private" before "recreational", under the topic heading "Cabins," consistent with Section 1303(b) of ANILCA. In addition, we suggest moving this section on "Cabins" to page 175 under "PUBLIC FACILITIES."

Page 202, Cabin Management - We suggest replacing the second sentence of this section with the following: "The Service currently has no plans for constructing or designating new public use cabins, however, cabins may be constructed or designated during the 10-15 year life of this plan, if deemed necessary for resource management and/or public health and safety."

In addition, we note that there may be cabins on the refuge which are not currently under permit. The state encourages FWS to allow intermittent, public use of these cabins on an informal basis for authorized refuge activities. The National Park Service has adopted a policy which allows such use in the Gates of the Arctic National Park and Preserve. (See Gates of the Arctic General Management Plan, page 158).

The state also encourages the FWS to carefully research patterns of use for particular cabins before declaring them abandoned. Cabin use can vary from year-to-year for a variety of reasons. Cabins should not be considered abandoned based on a single year of non-use.

WILDERNESS MANAGEMENT

Page 43, Paragraph 1 - The state disagrees with FWS's position that "wilderness designation would preclude the development of ... new permanent facilities by guides or outfitters * * *." Section 1303(b) of ANILCA provides for the construction of new cabins if necessary for the "continuation of an on-going activity or use otherwise allowed within the unit..." The state interprets this section of ANILCA as amending implementation of the Wilderness Act in Alaska, consistent with the following statement of congressional intent (SR 96-413, November 14, 1979, pg. 308 - 309):

It is recognized that some uses which are allowed within wilderness areas designated by this bill, most notably guiding and trapping, may in some areas require the use of rudimentary line cabins,

shelters, caches, and other minimal support facilities. Without recognition of these incidental uses and facilities, guiding, trapping and other allowed uses, while technically allowed, would be impossible to conduct as a practical matter. Therefore, the Committee intends that those related uses and facilities required to accomplish uses otherwise allowed within wilderness areas shall also be allowed, consistent with the allowed use and the purposes of the areas designated as wilderness.

We therefore request revision of this policy statement in the CCP.

In addition, the state reiterates its request that the CCP clarify that the FWS has the discretion to allow limited use of motors (e.g. chainsaws and generators) within wilderness areas, if such use was established prior to designation of the area. (See 50 CFR 35.5). We note that the Alaska Land Use Council, at its November 24, 1987, meeting, unanimously adopted a motion urging the FWS to maintain flexibility to allow limited use of mechanized equipment where necessary to support traditional activities and where it would not significantly detract from wilderness values.

TEMPORARY FACILITIES

Page 178 - 179 - The narrative under "Moderate Management" states that "guiding and outfitting services and related temporary support facilities would be permitted." This provision for temporary support facilities, however, is omitted under the headings "Minimal Management," "Wild River Management," and "Wilderness Management." The state requests that this allowance be explicitly addressed in the narratives under these headings, consistent with Section 1316 of ANILCA and the central management table on page 175.

ACCESS

Page 175, Public Facilities - We suggest footnoting this section with a reference to Title XI, similar to the footnote included in the Public Access Methods section on page 173.

Page 200, Paragraph 1 - The state requests that off-road vehicles be added to the list of access means traditionally used for subsistence purposes. The CCP notes on page 138 that "three-wheelers are commonly used in and around all of the communities * * *."

Page 216, Public Use and Access Management - The state requests that FWS modify its statement that "the use of off-road vehicles... for recreational purposes would be prohibited" to

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acknowledge FWS authority to designate ORV routes and areas. Executive Order 11644 and 43 CFR 36.11 provide FWS with this authority.

AIR AND WATER QUALITY

Page 194, Air Quality - The state suggests that this section reference the discussion of arctic haze on page 59 and potential airshed impacts associated with existing and future north slope oil and gas development. In addition, the state urges the FWS to put a priority on collecting ambient air quality data, in cooperation with the Alaska Department of Environmental Conservation, in the near future.

FISH AND WILDLIFE

Data provided in the wildlife narrative (e.g., muskox, page 110; dall sheep, page 112; brown bear, page 114; Wildlife Management Goals and Objectives, page 188-189) refer to "population" of the refuge rather than to "numbers" occurring on the refuge. For example, the muskoxen that occupy ANWR are not a discrete population; many animals occur outside the refuge boundary, hence the number of animals in the actual population is greater. We suggest the FWS edit this portion of the CCP to avoid potential misapplications of the term "population" and include the most current numbers available for publication in the final CCP.

Page 188 refers to "Alaska Lands Act obligations to maintain natural diversity of managing indigenous populations so that they do not decline unnaturally below the levels that existed on December 2, 1980." We request this statement be deleted since the FWS and the Alaska Department of Fish and Game (DFG) should not be bound to an artificial population level goal, and ANILCA does not specify management be based upon any single year (1980) population level. In addition, we note that there is little data documenting "natural population levels" and/or levels in 1980.

Page 153, Sport Hunting - The following 1987-88 harvest figures* (through 2/10/88) should be used to correct and update this section:

Sheep harvest (north side only) = 172 sheep/252 hunters

Moose harvest (north side only -- most moose probably taken outside the ANWR) = 39 moose/59 hunters

Caribou harvest (few are taken in ANWR on north slope in 26B) = 17 caribou in GMU 26C/30 hunters; 64 caribou in GMU 25/87 hunters.

* Source: DFG, Game Division, preliminary data.

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Page 210, First Paragraph - The FWS's intent to allocate areas to outfitters "to reduce the potential for overharvest of game animals in the more popular hunting areas" appears inappropriate. Harvest, monitoring, game regulations and the prevention of overharvest are the responsibility of the Board of Game and DFG. According to the DFG/FWS Memorandum of Understanding, problems will be resolved via the state's regulatory process if at all possible prior to "intervention" by the FWS. We hope that FWS will exhaust these available avenues first before attempting to regulate users to avoid conflicts. We request opportunities for further discussion on this concern.

OIL AND GAS POTENTIAL

Page 71, Oil and Gas Resource Potential - The state reiterates its request that the CCP acknowledge the presence of large subsurface structures trending east of the Aichilik River to the Canadian border. The state notes that surficial geologic mapping along the Leffingwell Ridge, which extends into this region, also indicates the presence of good source and reservoir rocks.

MANAGEMENT COSTS

Page 397, Relative Cost of Implementing the Seven Alternatives - Alternative A is described throughout the CCP as the "Current Situation," in other words, status quo. However, we note the projected management costs on page 397 require an 80 percent increase in funding over current levels. The only apparent reason for this projected increase is an intent to hire 10 more permanent staff. Analysis of Alternative A indicates most of these staff would be used for fisheries and wildlife management and research related projects. The state encourages FWS to consider alternative options for meeting these needs, such as funding existing DFG staff to conduct management and research projects, particularly given DFG's primary responsibility for fisheries and wildlife management. Use of this option is likely to substantially reduce the project funding needs for this alternative as well as provide a valuable way for FWS to utilize existing knowledge and expertise.

Page 398, Table 28. Are the "Refuge Development Costs" presented in this table an annual cost or a one-time expenditure? The accompanying discussion on page 392 does not answer this question.

LAND STATUS

Page 55, Land Status - Consistent with previous state comments, we request that this section address state tidelands and those submerged lands that are not in dispute.

Page 57, Land Status Table - The state requests that the

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following footnote be added to this table, as was included in the final Selawik CCP:

This table does not include submerged lands beneath navigable and nonnavigable waters; and unknown acreage of submerged land within the refuge boundaries. Lands under navigable waters are in state ownership. The navigability of many of Selawik Refuge's waters has not been determined. There is also an undetermined amount of land that is or may be encumbered under 17(b) easements or RS 2477 rights-of-way.

Page 193, second paragraph - This paragraph should reference tide and submerged lands, including definitions of these terms, along with the discussion about shorelands and water.

SUBSISTENCE

Page 34, Effects of the CCP on subsistence activities. This section states that the FWS "generally" would not permit activities that would significantly restrict subsistence activities. The state requests clarification regarding the circumstances under which such activities would be permitted.

Page 89-123, Biological Environment, Fish and Wildlife. Although harvest and use of fish, wildlife, and marine mammal resources should be discussed in this section, we believe the most detailed discussion of harvest and harvest levels belongs in the section on "Subsistence Uses" (pages 140-150). We recommend that the FWS review and revise both sections accordingly.

Page 109, Porcupine Caribou Herd. More recent harvest data sources are available and should be considered for acknowledgement in the plan. These sources are:

- a) Ray Quock and Jean Carey, 1987. Porcupine Caribou Harvest by Canadian Users, June 1986 - December 1986. A progress report prepared for the Porcupine Caribou Management Board. Whitehorse, Yukon: Yukon Department of Renewable Resources; and
- b) Norman Barichello and Jean Carey, October 1986. Porcupine Caribou Harvest by Canadian Users, January 1985 - June 1986. Whitehorse, Yukon: Yukon Department of Renewable Resources.

Page 114, Dall Sheep. North Slope Inupiat continue to harvest Dall sheep for subsistence purpose, as do non-Native residents of Kaktovik and Athabaskan residents of Arctic Village. We have no information on the non-village-based residents of the refuge south of the Brooks Range.

Page 118, Wolves. It appears that the first sentence of the fourth paragraph should read "The number of wolves harvested * * *."

Page 123, Whales. We recommend that the first sentence in the last paragraph of this section be revised to read "subsistence culture and economy in Kaktovik." To refer only to the importance of whaling in cultural terms understates its importance in the Kaktovik economy.

Page 127, Population Patterns. We suggest that the third sentence of the first paragraph would be more accurate if it read "Refuge lands currently are used most heavily by * * *." The likelihood of substantial change occurring in use of the ANWR for subsistence purposes may be low, but it is important to note that subsistence activities are dynamic and can be influenced by a wide range of factors beyond the control of local communities. We also recommend replacing "basically common" with "similar" in the last sentence of this section.

Page 130-131, Subsistence and Economic Orientation. We suggest that the FWS present a more balanced discussion of the mixed economies in Kaktovik and Arctic Village. In our view, the mixed cash-subsistence economies in both communities are vitally important and working effectively. The 1983 Caulfield report cited on page 131 includes some historical information for Arctic Village and Venetie comparable to that presented for Kaktovik on page 130. The 1983 Caulfield citation is listed in the text in a way that leads the reader to conclude that it concurs with the Nelson citation, i.e., that a movement away from a subsistence lifestyle is occurring in South Slope communities. This is not the case. We also request that the FWS check the Nelson 1973 citation to determine whether the comments attributed to him refer to the communities focused on in this CCP or on other villages in the area. As we have noted in the past, it is possible that Nelson would not make the same statement today about the Gwich'in communities he observed. The fact that the observations of Caulfield and Nelson differed and occurred a decade apart may illustrate the dynamism inherent in economies which utilize fish and wildlife resources.

Page 140, Subsistence Uses. The third paragraph in the introductory section is essentially correct. Recent revisions to the state subsistence law resulted in all communities in the ANWR area being classified as rural for purposes of the subsistence priority. Consequently, residents of these communities will harvest fish and wildlife resources managed by the state under any subsistence regulations which may be in effect for areas in which they have a customary and traditional use of the particular resource. The only exception is furbearer trapping, which currently is not regulated as a subsistence activity, but is an

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important component of the seasonal round of harvest activities in rural areas.

Page 146, Figure 28. This map excludes the Bureau of Land Management (BLM) managed Venetie Strip lands from those utilized by Arctic Village for subsistence purposes. The accompanying text says that areas used "in and near the refuge" are depicted, which is not entirely true if the BLM lands are excluded. We suggest either their inclusion or a modification of the text.

Page 149, Figure 29. This map depicts only areas on and near ANWR that are used by Chalkyitsik, Fort Yukon, and Venetie for harvesting resources. As such, it is not comparable with Figures 27 and 28, which depict all or most of the areas used during an unspecified time period by Kaktovik and Arctic Village. We recommend that the title of Figure 29 be revised to specify that only refuge area uses are shown. We also note that the Fort Yukon subsistence use area data collected by Caulfield was based on a very small sample size and may underrepresent areas within the refuge used by that community. The DFG Division of Subsistence is updating the Fort Yukon subsistence use area maps and later this year will have more current information available. If the FWS actually used maps it developed based on the Caulfield maps and modified during the community visits associated with planning for the Yukon Flats Refuge, then this should be noted on the maps.

Page 151, Figure 30. As in Figures 28 and 29, this map depicts only refuge areas used by non-village-based residents. Either the title should be changed or the BLM lands used should be portrayed. Lands used outside the refuge boundaries are depicted, so all lands used within the boundaries should be shown.

Page 185, Cooperation and Coordination. We appreciate the FWS commitment to continuing a close working relationship with the state in the ANWR area. In addition to working with other divisions in DFG, we encourage FWS to also cooperate with the Subsistence Division regarding subsistence research efforts for the ANWR area. Since the Subsistence Division has an annual harvest monitoring program in place in Kaktovik and the FWS has found these data helpful for management efforts, we encourage the FWS to support future monitoring efforts. We have noted the FWS's interest in documenting subsistence use of fishery resources on the refuge (page 187), and consider cooperation in this area as an excellent opportunity for the FWS to carry out ANILCA Section 809 and 812 directives. We also have noted the FWS' commitment to cooperative subsistence monitoring with the DFG cited on page 199 in the fourth paragraph.

Pages 213-260, Description of the Alternatives. The "Subsistence Management" section of each Alternative indicates that the FWS

will work "with local residents to ensure that big game populations are maintained on the refuge." We recommend that this statement be amended to include marine mammals, furbearers, small game, birds, and fishery resources.

Page 261, Environmental Consequences. We found this section of the draft plan to be informative, though largely speculative. Oil and gas exploration and development are occurring and may accelerate in some areas offshore, nearshore, and on the North Slope. Therefore, we believe an accurate assessment of environmental and other impacts must take into consideration the cumulative effects of other development activities and should not be limited to the refuge. Otherwise, the full scope and potential magnitude of land use activities and their potential impacts will remain unexamined. The FWS should emphasize that their assessment only partially addresses the impact scenario in ANWR excluding the 1002 area, and acknowledge that development activities collectively may have a very different effect on the environment and resource user groups than may be portrayed at this time.

Pages 263-265, General Assumptions. Should one or more of the assumptions used in the plan prove to be incorrect, the consequences could be significant. Therefore, we suggest that the FWS note in the plan that these assumptions will be reassessed both during the step-down planning process and when the plan is periodically considered for revision.

Page 265, Alternative A. To underscore the concern expressed in our comment regarding page 261, it is unclear what effect an increase in the number of recreational hunters might have on subsistence hunting on and near the refuge if an evaluation is based solely on the projections presented here. Other factors may intervene to influence where and to what extent the refuge area is used for subsistence purposes. Expansion of oil development activities on the North Slope could influence where Kaktovik hunters hunt moose and caribou, for example, and could affect the availability and distribution of big game animals.

Pages 277-278, Alternative A, 810(a) Evaluation and Finding. The FWS should be cautious in concluding that Alternative A would not affect the subsistence needs of ANWR area residents relative to 1987 use levels, when supporting quantitative data are not presented. While we may not dispute the finding of no significant restrictions on subsistence uses, we urge the FWS to strengthen its subsistence data base so that the effects of implementation of this plan (whatever Alternative is selected) can be measured more accurately. The final sentence in the third paragraph assigns responsibility for monitoring subsistence use levels to DFG and the FWS. As we indicated in our comment on page 187, the Subsistency Division is eager to cooperate with the FWS in the ANWR area. The next to last sentence in the Findings

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section on page 278 refers to "subsistence user needs" and "subsistence use." We request that the FWS define the terms being used so that the reader can better assess how to distinguish between "needs," "uses, and "opportunity."

Pages 308-310, Alternative B, §10(a) Evaluation and Finding. We question the FWS conclusion that this alternative "has the highest potential to adversely affect subsistence uses of refuge resources * * *," but that it "would not affect the subsistence needs of local residents," which are projected to neither increase or decrease relative to their 1987 level. The information presented in this section does not adequately support the later conclusion. We also question the FWS assertion that residents who find subsistence resources displaced due to development activities need only move to a nearby area to find adequate alternatives. This may be true, but should be supported with more convincing evidence based on an understanding of local land and resource use patterns.

The discussion of displacement on page 308 and conclusion that any such problems can be resolved by residents moving to "nearby areas" does not consider the fact that this might increase competition in these nearby areas and that nearby areas may not be available for activities that could be displaced by development (e.g., furbearer trapping). Nor does the FWS comment on the possible limitations related to nearby areas being used for other economic purposes. Since "needs" or "demand" for fish and wildlife resources should not be expected to change if local residents are displaced due to development (and, in fact, could increase if the development somehow had a negative effect on the cash economy of the community), the FWS should not assume that simply shifting harvest efforts to nearby areas is a panacea.

In the Findings section on page 309, the FWS should specify why the potential effects of Alternative B on Porcupine caribou would not also reduce the number of caribou available to Kaktovik. The last sentence of this section suggests that the FWS and the DFG have the power to guarantee that "subsistence user needs" will not be adversely affected by increased public use of the refuge. We are uncertain whether this is a responsibility of the DFG, and believe the state's obligation is rather to ensure that continued opportunities are provided for subsistence uses and that the subsistence priority be implemented if necessary.

Page 382, Mitigation. In the first full paragraph on this page, the FWS mentions "instituting eligibility requirements, limiting use, or restricting activities" to protect refuge resources if public use reaches certain levels. It is unclear if these possible restrictions are aimed at local communities or the general public. Clarification is requested.

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On behalf of the State of Alaska, thank you for the opportunity to review this draft. If we can be of assistance in clarifying these comments, please contact this office.

Sincerely,

Robert L. Grogan
Director

Michelle Sydeman
by: Michelle Sydeman
CSU Coordinator

cc: Commissioner Judith M. Brady, DNR
Commissioner Don W. Collinsworth, DFG
Commissioner Dennis D. Kelso, DEC
Commissioner Mark S. Hickey, DOT/PF
Rod Swope, Special Staff Assistant, Office of the Governor

Responses to the State of Alaska

- 539
1. We agree that a major revision of the plan may be needed following congressional action on the "1002" area, and that this action may have a significant bearing on management of the rest of the refuge. We have added a paragraph in the text that acknowledges this point.
 2. The text has been revised as suggested.
 3. We have substituted "traditional" for "subsistence" as suggested. We did not add in "private" before "recreational" because these cabins are not intended for either private or public recreational use. We also did not follow the suggestion to move the cabins heading under public facilities because the cabins on the refuge are not public use cabins and the Service has no intention of providing public use cabins on the Arctic Refuge. (Administrative cabins, which can be used for public health and safety, are addressed elsewhere in the text.)
 4. We have revised the text to note that the Service has no plans for new public use cabins, but cabins may be built or designated if deemed necessary by the Service for resource management or public health and safety (except in Alternative G). The text also has been revised to indicate that the Service will research patterns of use for cabins not being actively used before declaring them abandoned. However, we disagree with the recommendation to allow intermittent, public use of cabins not under permit. We do not want to accept the responsibility for maintaining these cabins or the liability for their use. All cabins determined to be abandoned, after careful research, will be disposed of in accordance with the Service's cabin policy and Title 41 of the Code of Federal Regulations.
 5. Comment noted. Guides and outfitters have not used permanent facilities in the Arctic Refuge. Our cabin policy does not permit the development of new permanent facilities for guiding and outfitting in wilderness areas.
 6. Comment noted. Service policy does not permit the use of chainsaws and generators in wilderness areas (with the exceptions of chainsaws used for subsistence and motorized equipment used as a minimum tool for administrative purposes).
 7. We have added the provision for temporary support facilities into the minimal management, wild river management and wilderness management categories as you requested.
 8. Comment noted. Title XI does not apply to several of the public facilities identified in the table. All of the transportation systems discussed under public facilities in the table may be permitted or provided in all of the management categories, with the exception of roads--and in this case Title XI is referenced.
 9. Comment noted. The Service does not distinguish use of off-road vehicles by different user groups--in all cases 43 CFR 36 applies, which prohibits the use of off-road vehicles except on routes or in areas designated by the refuge manager. Procedures to designate off-road vehicle areas and routes are identified in this regulation, and have been added to the common management directions in the final plan.
 10. Comment noted. The paragraph in question already references 43 CFR 36, which acknowledges the Service's authority to designate off-road vehicle routes and areas. We also have modified the public access common management direction in the final plan to quote the regulation.
 11. We have modified the text to recognize that arctic haze and existing and future north slope oil and gas development may affect the refuge's airshed. The Service will collect ambient air quality data as funding permits.
 12. Comment noted. The final plan includes the most current refuge population numbers available.
 13. The reference to 1980 has been dropped as you requested and replaced with the following sentence: "It is the intent of the Service to maintain wildlife populations on the Arctic Refuge at levels near the carrying capacity of refuge habitats, subject to naturally occurring fluctuations in populations."
 14. Updated harvest figures have been added to the text.
 15. Comment noted. The draft plan only stated that the Service was considering this action in the future. The text in the final plan has been revised to indicate that allocation of outfitter areas is a possible course of action. The Service will "exhaust all available avenues" working with the state before attempting to regulate users to resolve this problem.
 16. We have revised the text as requested.
 17. Comment noted. As stated on page 218 of the draft plan, the additional funding is not just for staff to do wildlife research studies--the increase in funding and staff would be needed for other tasks, including increased law enforcement, interpretive and environmental education program, management of public use, and monitoring developments on and adjacent to the refuge.
 18. Yes, these are one-time development costs.
 19. Comment noted. This point was already discussed in the "common management directions" in the draft plan, on page 193.
 20. We do not believe this recommended footnote is appropriate for the Arctic Refuge. This table does include within the conveyance acreages all non-navigable submerged lands conveyed and selected by specific village and regional corporations. The Service does not necessarily agree that lands under navigable waters passed to the State of Alaska under the Submerged Lands Act. The federal government claims all navigable waters (and submerged lands beneath these waters) were reserved by Public Land Order 82 prior to statehood. Table 3 only describes ownership within the refuge boundary. The 17(b) easements and RS 2477 rights-of-way claims do not affect ownership of the land.

21. We have modified this paragraph to note that pursuant to the Submerged Lands Act, the Alaska Statehood Act and the Alaska Constitution, title to all tidelands and submerged lands that were not reserved on January 3, 1959 transferred to the State of Alaska. It is recognized that the Service and the State may have differing interpretations of some aspects of this title transfer, both as to the laws and implementation of the laws based on facts.
22. Comment noted. It is difficult to clarify this point without having a specific activity to assess. The Service recognizes that subsistence is one of the primary purposes of the Arctic Refuge. All the steps identified under Section 810 of the Alaska Lands Act would be followed in making a determination that might restrict subsistence use. The Service would only restrict subsistence uses under special circumstances in which the long-term benefit(s) of the proposed activity would far outweigh the potential impacts to subsistence activities - and then the Service would try to minimize as much as possible the potential impacts.
23. We have moved detailed subsistence harvest level information to the discussion of "Subsistence Uses" where appropriate.
24. We have incorporated the most recent harvest data into the final plan.
25. The text has been revised to state that Dall sheep are harvested for subsistence purposes by residents of Kaktovik and Arctic Village.
26. The text has been revised as noted.
27. The text has been revised as noted.
28. The text has been revised as noted.
29. We have deleted the statement on future trends and the references, which should address this comment.
30. The text has been revised to note only that all harvests of refuge resources by local residents potentially qualify as subsistence use.
31. The map will be changed as suggested.
32. We have modified the figure heading to indicate resources harvested on or near the refuge. Caulfield's map was modified based on unpublished data collected by the Service; the source has been changed to note that the Service modified Caulfield's map.
33. The map will be changed as suggested.
34. We have changed the text as recommended.
35. Comment noted. As you noted, this section is largely speculative. We agree that the assessment does not address the potential impacts that may occur to the refuge from developments outside the refuge, which collectively may have a very different impact on the refuge than that portrayed. We will add a sentence to the section that acknowledges this point. It is not possible now, however, for the Service to do an "accurate" assessment of cumulative impacts to the refuge without more information on site-specific projects outside of the refuge's boundaries--there is too much uncertainty to analyze what will happen to the refuge at this point in time. When environmental impact statements are prepared to analyze the effects of specific projects outside the refuge in the future they should address cumulative impacts to the refuge.
36. Comment noted. We agree that if the assumptions are incorrect, the consequences could be significant. The assumptions are included for analytical purposes and are intended to portray a hypothetical situation. When a specific project is proposed, the Service will assess the project making whatever assumptions are appropriate at that time.
37. Comment noted. We agree that the subsistence data base should be strengthened, and have so stated in the draft plan (see pages 187 and 199 of the draft). We have revised the statement on page 278 changing "subsistence user needs" to "subsistence use."
38. We agree with the comment, and have revised the text to note that this alternative has the highest potential of all the alternatives considered to adversely affect subsistence user needs. We also have revised the text to indicate that local residents may or may not be able to find adequate resources in nearby areas if subsistence resources are displaced from the projected oil development. The text has been changed to note that local residents probably could find adequate resources in areas near the mining and timber harvesting operations. Although we agree residents moving to nearby areas may not resolve problems, in this case we believe local residents probably could find adequate fish and game in nearby areas. As described in the scenario, the mining and timber harvesting operations would affect relatively small areas; the mining operation also would not occur in an area that is heavily used for subsistence harvests.
39. See response #38.
40. Comment noted. As noted in the biological assessment on page 301 of the draft plan, the oil development considered covers a relatively small area and would occur in the herd's winter range. The primary effect would be displacement of caribou to other parts of their large winter range. This could reduce the number of caribou available to Arctic Village and Venetie residents on the winter range. Kaktovik residents, however, should not be affected because the development would not affect the caribou in their summer range. We have changed the text to note the Service and state will ensure that opportunities for subsistence uses are maintained.
41. We have clarified the text as requested to note that this section refers to recreation use, and that subsistence users would be given preference if it becomes necessary to restrict or limit public use.



Citizens' Advisory Commission on Federal Areas

April 25, 1988

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Arctic NWR Draft CCP
April 25, 1988
page 2

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Stieglitz:

The Citizens' Advisory Commission on Federal Areas has completed its review of the Draft Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review/Wild River Plan (DCCP/EIS/WR/WRP) for the Arctic National Wildlife Refuge (ANWR). We offer the following comments for your consideration.

PREFERRED ALTERNATIVE

The Commission is pleased that the U.S. Fish and Wildlife Service (USFWS) has developed a set of plan alternatives for the ANWR which presents a broad range of management proposals for consideration by the public. This is a distinct improvement over plans recently prepared for other Alaska NWR's, some of which provided the public with as few as two or three alternatives to consider which were more similar than dissimilar. Among the alternatives in the ANWR DCCP, the Commission believes the Preferred Alternative, "A", represents a reasonable balance between the protection of refuge resources and the need to maintain the opportunity to consider more intensive land uses consistent with the purposes for which the refuge was established at a future date. It is our view that Alternative A, of the seven alternatives present in the plan, best meets the long term public interests of both Alaska and the U.S.

WILDERNESS REVIEW

We endorse the plan's Preferred Alternative primarily because of its recommendation that there be no further Wilderness designated on the Arctic NWR. This will provide a measure of flexibility that will allow the Service to respond to changing circumstances. Such response might include the need to take management actions such as habitat improvements or the construction of administration and/or public use facilities, both of which actions would be complicated at best or at worst precluded by Wilderness management. Because Wilderness does impose strict limits on resource management options, future efforts to update the plan's land use categories to reflect changes in management objectives could be seriously hindered. Indeed, wherever Wilderness is concerned, revisions to the plan might literally require the consent of the Congress. We believe the Service must preserve, for its own management needs and the needs of cooperating agencies such as the Alaska Department of Fish and Game (ADFG), the ability to exercise a full range of resource management options that can be implemented in an orderly manner.

Existing authority, including the National Environmental Policy Act (NEPA) with its public review requirements, is sufficient to protect the important resource values of the Arctic NWR without complicating the management of the refuge by imposing a package of unnecessary Wilderness management restrictions on the Service, cooperating agencies, or the public.

Congress has recognized the unique circumstances in Alaska by including language in ANILCA which modified the Wilderness Act. It is unfortunate that federal personnel are often unfamiliar with the intent behind the special provisions of ANILCA that were designed to allow for the continuation of traditional activities on Conservation System Units (CSU's) established or expanded by the act, including Wilderness areas. This has resulted in erroneous interpretations of the law and implementation practices which have been adverse to the interests of people engaged in traditional activities allowable under ANILCA. Even where the special provisions of ANILCA are recognized, traditional activities in Wilderness and non-Wilderness areas of CSU's are often unnecessarily restricted and/or regulated in a manner which sometimes discourages people from openly engaging in what are otherwise allowable activities (see discussions on cabins and mechanized equipment in Wilderness areas below). This is certainly not what Congress intended. Until the Commission is assured that additional Wilderness designations would not exacerbate the poor record of federal agencies adherence to those provisions of ANILCA intended to protect Alaskans' traditional use of lands, we cannot support any planning alternatives which include Wilderness recommendations.

Native corporations own or have selected 181,000 acres of lands within the Arctic NWR. Some of these lands are subject to ANCSA Section 22(g) which requires that corporate lands selected within the pre-ANILCA portions of the Arctic NWR be subject to the laws and regulations governing use and development of the refuge. Although the FWS has long promised the promulgation of 22(g) regulations to enable landowners to understand the legal environment their decisions must be made in, these regulations have not been issued. Wilderness designations in proximity to any corporate inholdings would pose considerable potential for conflict although there is little doubt the impact would be greater on 22(g) lands.

In addition to the reasons for supporting Alternative A which we have discussed above, we believe the Service has demonstrated considerable prudence in avoiding conflict with smaller inholders in its decision to not recommend further Wilderness designation in the Arctic NWR. There are also 173 applications for Native allotments in the Arctic NWR totaling approximately 15,000 acres. In addition, there are 1,000 acres of other privately owned (non-corporate) lands. The interests of small landowners would ultimately be adversely affected to one degree or another by nearby Wilderness designation. Because these inholdings are owned by individuals rather than corporations, legal complications arising from conflicts with Wilderness management would put these people at a serious disadvantage inasmuch as they might not have ready access to competent legal representation. While it is true that conflicts between small landowners and refuge managers may occur in non-Wilderness areas, the likelihood and intensity of conflicts become magnified where designated Wilderness is involved. Already there have been calls by Wilderness proponents for the FWS to exercise the acquisition authority of the Secretary found at ANILCA Section 1302 to

remove inholdings in the Arctic NWR and other refuges in Alaska. In addition to supporting the Service's decision not to recommend further Wilderness in the Arctic NWR, we encourage the FWS to maintain its policy of acquiring inholdings only on a willing seller basis and with fair compensation being made for the loss of benefits associated with ownership of the lands involved. We also encourage the Service to utilize wherever possible and desirable such alternative methods of influencing inholder land use such as Alaska Land Bank Program agreements authorized by ANILCA Section 907 or Cooperative Management Agreements authorized by ANILCA 304(f)(1).

ENVIRONMENTAL CONSEQUENCES

The usefulness of the discussion of environmental consequences which begins on page 261 is limited given the lack of consideration of impacts associated with oil and gas development which may occur in the Arctic Coastal Plain (ANILCA Section 1002 area). If oil development leading does occur in the "1002" area, the Minimal Management assumptions made in the Draft CCP become meaningless. The plan even admits this to some extent: page 262 of the plan states:

"The management and use of the "1002" coastal plain requires special attention. The refuge comprehensive plan treats the federal lands in the "1002" area as a minimal management area in all alternatives, pending congressional action. This chapter therefore only assesses the effects of minimal management for the "1002" area (ANWR DCCP emphasis). At some point in the future Congress will take action which affects the use and management of this area. Potential impacts to the "1002" area...are addressed in a separate document, the Arctic National Wildlife Refuge, Alaska Coastal Plain Resource Assessment and Final Legislative Environmental Impact Statement, and are incorporated by reference into this document."

If the minimal management assumptions of the DCCP will no longer hold for the 1002 area, does this mean that a new set of "intensive management" assumptions automatically become effective for the Draft CCP? If so, there should be an acknowledgement and discussion of this in the plan. Although it is true that there are discussions of the environmental consequences of oil development in the "1002 report", this document has an entirely different purpose from that of the Draft CCP: it is not a management plan. We do recognize that a leasing decision can only be made by the Congress. It is our anticipation that any legislation providing for oil leasing and development in the ANWR will not address other public uses, that, in fact, the Service will retain the broad authority it presently has to manage public uses on the refuge. This brings to mind a number of deserving questions the draft plan fails to answer.

If the Congress chooses to allow leasing and development on the coastal plain, what conflicts between economic uses (oil development) and other public users are envisioned? What management steps will be taken regarding access into the area for subsistence and recreation purposes? While the mitigation measures which might be taken to protect biological resources are reasonably easy to identify and will involve input from many agencies from all levels of government, it is less clear what actions will be necessary to

provide for the safety of the public and the security of development facilities. Will the public have an opportunity to participate in development planning decisions that affect public access for subsistence and recreation? We urge the FWS to provide maximal opportunities for the public to participate in these decisions.

Recognizing that there are many, many unknowns at this point, we understand the FWS cannot provide definitive answers in the draft plan. However, we do believe that some discussion indicative of the directions the Service will take regarding these issues is warranted. This is especially so because the "1002 report" did not provide adequate treatment of management directions. We add that this may be appropriate inasmuch as it was not intended to be a management plan. We also add that the opposite is not true: the Draft CCP is a management plan for the ANWR and the Arctic Coastal Plain is an intrinsic part of the ANWR. We therefore question the exclusion of the "1002 area" from the Draft CCP inasmuch as impacts on the refuge from the proposed oil development in the "1002" areas and elsewhere cannot be properly assessed under separate documents.

CABINS

Several discussions in the Draft CCP regarding use of cabins are inconsistent with the provisions and intent of ANILCA. On page 30 and on page 202 of the Draft CCP, it is implied that under ANILCA only local residents engaged in "trapping and other subsistence activities" may utilize cabins located on the ANWR. Trapping is not a strictly subsistence activity, although we agree that both subsistence users and trappers along with other users engaged in traditional activities may utilize cabins. ANILCA 1303(b)(2) allows for the use of existing cabins by persons engaged in customary and traditional uses as long as the activities are determined to be compatible with refuge purposes. ANILCA 1303(b)(4) allows for the use of cabins not under special use permit by the general public if so designated by the refuge manager. These cabins should be designated for public use and safety in accordance with these provisions of ANILCA unless the Service demonstrates that their use is not compatible with the purposes of the ANWR.

The plan indicates on page 202 that there are approximately 47 "subsistence use" cabins in the ANWR, 13 of which are not being actively used. The term "approximately" indicates that the Service has not conducted a detailed inventory on the number of cabins in the ANWR. Subsistence use patterns are dynamic and may exhibit annual variations dependent upon a number of factors. Consequently, use of cabins for subsistence purposes is not constant. We encourage the FWS to conduct a thorough inventory of existing cabins and monitor their use over several years before arriving at conclusions regarding their use.

The statement on page 211 regarding abandonment of three cabins, two of which are now being used by the Service as administrative cabins should recognize the point made above. Cabin use may be highly variable from year to year depending on the dynamics of subsistence or other traditional use patterns. The Service should not assume that a cabin is abandoned merely because use has not occurred in the past year or two. Additionally, cabins not under special permit can be designated for use by the general public engaged in traditional activities that are compatible with refuge

purposes. As discussed above, such use is consistent with ANILCA Section 1303(b)(3) and Congressional intent.

The statement on page 43 that "Wilderness designation would preclude the development of visitor facilities, the development of new permanent facilities by guides or outfitters..." is not consistent with the provisions of ANILCA Section 1303(b)(1). This provision allows for the construction of facilities "necessary to provide for a continuation of an ongoing activity or use otherwise allowed within a unit or area..." As discussed above, ANILCA Section 1303(b)(4) provides for new cabins and structures for use by the general public. We add that ANILCA Section 1306(a) and (b)(3) does allow the Secretary to provide visitor facilities on any conservation system unit, including Wilderness.

MOTORIZED EQUIPMENT IN WILDERNESS AREAS

We are concerned with the discussions on page 43 and page 179 regarding the uses of motorized equipment in Wilderness areas. These discussions indicate that the use of chainsaws is prohibited except for subsistence purposes and that the use of other motorized equipment such as portable generators and water pumps is entirely prohibited. It appears to the Commission that the FWS is interpreting in an overly restrictive manner the provisions of ANILCA 1316 and 50 CFR 35.5 governing allowed uses of motorized equipment in Wilderness areas. ANILCA Section 1316 states:

"(a) On all public lands where the taking of fish and wildlife is permitted in accordance with the provisions of this Act or other applicable State and Federal law the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuation of existing uses...other temporary facilities and equipment."

The regulations at 50 CFR 35.5 state:

"The Director may permit, subject to such restrictions as he deems desirable, the landing of aircraft and the use of motorized equipment at places within Wilderness where such uses were established prior to the date the wilderness was designated by Act of Congress as a unit of the National Wilderness Preservation System."

At the November 24, 1987 meeting of the Alaska Land Use Council, a motion was unanimously adopted which encouraged the FWS to maintain flexibility to allow limited use of mechanized equipment where necessary to support traditional activities and where such use would not significantly detract from wilderness values. The Service indicated at that time that the use of such equipment was permissible where traditional and when used in support of guiding and outfitting operations. We request that the FWS revise the Draft CCP to acknowledge that the Regional Director retains the discretion to allow use of motorized equipment. We encourage you to utilize this discretion consistent with regulations and allow such use.

REFUGE MANAGEMENT PLANS

The discussion on page 212 regarding the preparation of refuge management plans fails to mention what steps the Service will take to provide

opportunities for the public to participate in its "step down" planning efforts. On page 45 there is some acknowledgement that a public participation program will be a part of the development of "appropriate" management plans. We appreciate the Service's intent to involve the public in these future planning activities. However, we request that the Service clearly state in the Final CCP that any planning activities which would have an impact on public use and access will be in accordance with the NEPA public participation procedures and federal regulations. We note that the Service has indicated in the Record of Decision for other recently completed CCP's that refuge management plans will comply with the NEPA process.

Mention is made on page 201 of the preparation of a recreation management plan. The discussion also indicates that "Backcountry permits eventually may be required for all recreational groups." The discussion also mentions the possibility that regulations may be promulgated which would put limitations on the size of groups and the length of stay in certain areas. The Service's acknowledgement that restrictive actions are being considered underscores our previous comments regarding the need for public participation in "step down" planning efforts. We are not aware of a demonstrated need arising from conflict between user groups which justify the restrictions suggested on pages 200-201. We are aware that the group size restrictions and permitting requirements alluded to in the discussions cited above are similar to those in Alternative G, the so-called "Last Great Wilderness" alternative proposed by Wilderness advocates. The restrictions are unnecessary, unreasonable and as the Draft CCP correctly acknowledges, not in compliance with ANILCA. They cannot be implemented without Congressional action.

Any public use and access restrictions the FWS may wish to implement in the future must comply with the requirements of 50 CFR 36.42 regarding closure procedures. Restrictions on public use and access should be based upon biological standards to protect wildlife and only in concurrence with the ADFG and Alaska Board of Game. The Commission does not wish to see a situation develop in ANWR similar to what has happened in the Togiak NWR where visitation was restricted by special use permit stipulations limiting the number of passengers that air taxi operators may bring to the refuge. Our comments on the Togiak CCP stated our belief that such actions are a circumvention of the closure regulations of 50 CFR 36.42.

We hope that you will find our comments thought provoking and useful as you revise the Draft Comprehensive Conservation Plan for the Arctic National Wildlife Refuge. We look forward to participation in future planning activities for this and other refuges in Alaska.

Sincerely,


Stan Leaphart
Executive Director

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Responses to the Citizens' Advisory Commission on Federal Areas

1. We have not excluded the "1002" area from the refuge comprehensive conservation plan. As was noted in several places in the draft plan, until Congress takes action on management of the "1002" area the Service will continue to manage the area as a minimal management area. This management category addresses public uses, which you noted, as well as habitat/population management activities, public access, and economic uses. The plan assesses the effect only of managing the 1002 area as a minimal management area. We cannot anticipate what Congress will do with the "1002" area in this document. However, we have added a statement on the "1002" area on page 262 of the draft plan to indicate that if Congress takes action to permit oil and gas development, the Service will modify the plan accordingly. At that time the Service will address the questions raised in your comment. If necessary, major revisions to the refuge outside of the "1002" area will be made following the National Environmental Policy Act process. Opportunities for public participation will be provided as required under the National Environmental Policy Act.
2. Comment noted. The text on page 30 of the draft plan has been changed to more clearly distinguish trapping from subsistence and other traditional activities. We agree that under Section 1303(b)(4) the refuge manager has the prerogative to allow the use of cabins not under special use permit by the general public. However, as stated on page 202 of the draft the Service has no plans to provide public use cabins on the Arctic Refuge. The Service does not want to assume responsibility for maintaining cabins not under permit or the liability for using these cabins. Administrative cabins on the refuge can be used for public health and safety. (See also responses #3 and 4 to the State of Alaska.) The estimate of cabins on refuge lands used for subsistence and other traditional uses has been revised to 37 in the final plan; 12 of the cabins are under permit. A statement has been added to the text on the need to research patterns of use of the cabins not being actively used (see response #4 to the State of Alaska). We agree that a detailed inventory of the number of cabins and their uses is needed on the refuge and have so stated in the final plan. We also agree that cabin use may be highly variable from year to year. The two cabins you referred to now used by the Service were trespass cabins before the refuge was established and have been used by the Service since 1980.
3. Comment noted. See response #5 to the State of Alaska with regards to the development of new permanent facilities for guides and outfitters. Section 1306 gives the Service the discretion to provide visitor facilities in the refuge. The Service does not believe providing visitor facilities would be consistent with the purposes of assuring the preservation, protection and proper management of wilderness areas, and thus would not allow them in the Arctic Wilderness. (Cabins necessary for public health and safety could be built in wilderness areas, and are provided for under administrative facilities.)
4. Comment noted. In the Arctic Refuge the Service is not aware of any mechanized equipment that has been used to support guiding and outfitting operations prior to the establishment of the wilderness area. Therefore, the Service would not permit the use of motorized equipment for guiding and outfitting operations in the Arctic Wilderness. See also response #6 to the State of Alaska.
5. We have revised the text on refuge management plans to indicate that public meetings and/or hearings would be held when controversial issues or proposals are involved, such as management of public use and access. The Service would comply with National Environmental Policy Act public participation procedures and federal regulations before implementing management proposals that would affect public use and access.
6. During the planning process it was pointed out by various individuals and groups that certain parts of the Arctic Refuge already may be starting to be overused. The Service is not proposing to restrict size of groups, the length of stay, or requiring the use of backcountry permits at this time in the Arctic Refuge. Rather, the Service is acknowledging in the plan that if use continues to increase in the future it may become necessary to more intensively manage public use and access. The Service acknowledges that any public use and access restrictions must comply with the requirements of Title 50, Code of Federal Regulations, Part 36.42 regarding closure procedures. In accordance with Section 1110(a) of the Alaska Lands Act, public access would not be restricted unless such use was determined to be detrimental to the resource values of the refuge.

ARCTIC VILLAGE COMMENTS ON
DRAFT COMPREHENSIVE CONSERVATION PLAN
ARCTIC NATIONAL WILDLIFE REFUGE

April 8, 1988

Thank you for coming to our village to talk about your alternative draft Comprehensive Conservation Plans for the Arctic National Wildlife Refuge.

The plan for the Arctic National Wildlife Refuge must do two things:

- (1) protect the land and its life-giving abilities;
- (2) protect the Gwich'in culture and way of life.

None of your alternatives really meets the needs of our people.

We are opposed to the do-nothing approach of your preferred Alternative A.

If our people and our culture are to continue; if the Neets'ail Gwich'in, are to survive the future; then we must make plans that are positive, and take deliberate actions to achieve those ends. This is our responsibility.

We support an Arctic Village Alternative. This alternative will reflect the way the Gwich'in use the land, the importance of protecting habitat, and the need for community economic and social development.

We want to make the following points at this time:

1. The calving grounds of the Porcupine caribou herd must be protected as Wilderness. We can go out right now and show you caribou fences over 300 years old that show the caribou has come to this area over the same migration route for generations. Even a small shift could leave the caribou out of reach of our village. This is a life and death issue for our community.
2. Arctic Village strongly supports expanding Wilderness for the Arctic Refuge. Those areas that we use heavily will not be wilderness (see map) They are:
 - 1) around Old John Lake,
 - 2) Junjik River from above Timber Lake downstream,
 - 3) East Fork Chandalar from Red Sheep Creek downstream,
 - 4) the lower Wind River.

These areas are used by our people for many purposes all year round. They also include many allotments and other sites that are important to us. Because of the possibility

of conflicts, these areas should NOT be included in Wilderness. They should be managed in co-operation with our IRA Tribal Government and village councils for the benefit of both culture protection and wildlife protection.

One particular problem is the way you define commercial logging. We will need logs for public buildings, to take care of visitors, and for other reasons. We must be able to pay our people to get logs for a new church or lodge or community house or any other building we need without interference. Whether or not we pay someone for the logs, or whether the logs are for a house or another building shouldn't make any difference. We will still need the logs. You should be opposed to logging for non-local uses, not commercial logging that meets our local needs. What about old people who must buy firewood?

Keeping these areas out of wilderness will protect us from these policies and will avoid many many problems in the future.

3. For the Porcupine River area, we support wilderness only if the people who use that area - from Ft. Yukon, Chalkytsik and Salmon Village - do not object.

4. The water rights section, p.192, should recognize our Tribal water rights in this area, including 1/2 of the riverbed and the water in the Chandalar River.

5. We have also had problems getting our Native Allotments approved, and also with trespassing on these lands. Your management plan should put a priority on surveying the Refuge boundary around these allotments, and complete the transfer. This should be done within five years at the most. Too many of our people have died without ever having their history right to these lands recognized. It's time for you to accept your responsibility on this.

6. We must now formally request that you not issue a use permit for any lands with allotment claims. These are private lands and should be treated as if title was already transferred.

7. We agree with the management ideas of Alternative G - to control recreation to avoid conflicts with wildlife or subsistence values. Also that you do not build cabins on the refuge or advertise it like a National Park.

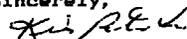
8. Among the groups you should consult with, you forgot to mention: the People of Old Crow, who live right across the border, and also the US-Canada Porcupine Caribou Board. Also you should know that we are governed here by the Arctic Village Council and our IRA government. There is no "city" here.

Responses to Arctic Village

Village Council and our IRA government. There is no "city" here.

Thank you for the opportunity to make our comments on the Comprehensive Conservation Plan. We hope you find our Alternative will help you to meet your responsibility to protect the land and the wildlife and the Gwich'in people who are all part of the Arctic National Wildlife Refuge.

Sincerely,



SGT KIAS PETER JR.
DET TRAINING NCO

KIAS PETER JR.
PO BOX 22032
ARCTIC VILLAGE, AK 99722

1. Thank you for the alternative you proposed. We appreciate your concerns regarding management of the Arctic Refuge and its resources and protection of your culture and way of life. We cannot, however, support all of the recommendations you proposed. Although we recognize your concern regarding the calving grounds of the Porcupine caribou herd, the Service cannot propose this area for wilderness. Congress is presently debating the future of the coastal plain, including whether or not it should be designated as wilderness. We have modified several of the wilderness proposals in the alternatives as you suggested to eliminate potential conflicts. We still do not believe, however, that additional wilderness needs to be designated in the refuge--under minimal management designation the Service should be able to adequately protect refuge resources and maintain opportunities for subsistence activities.

With regards to commercial logging, we believe your concern is unwarranted. Although commercial logging would not be permitted in the refuge, this applies only to the sale of logs outside of the refuge as a business. Local residents still could cut firewood and logs for public buildings in the village and be paid so long as it was not classified as a business. Local residents also will be able to collect house logs and collect firewood for personal or extended family use, subject to reasonable regulation (see page 172 of the draft plan).

The question of tribal water rights ownership is beyond the scope of the Arctic Refuge plan and cannot be addressed here.

The processing of Native allotment applications and surveying of Native allotments is also beyond the scope of the Arctic Refuge plan (see response #1 to the International Porcupine Caribou Commission). With regards to Native allotment claims, until the Bureau of Land Management formally approves a Native allotment application and title to the land is conveyed, the land remains under the Service's jurisdiction. Although the Service reserves the right to issue special use permits on refuge lands with Native allotment claims, it generally would not do so until the Bureau of Land Management has completed its review of the claim.

With regards to conflicts between recreational users and wildlife and subsistence, the Service has not yet identified significant conflicts on the refuge. As noted on pages 200-201 of the draft plan, under all of the alternatives the Service could restrict recreational use if these potential conflicts do arise on the refuge. The draft plan notes on page 211 that the Service will continually assess the facility needs of the refuge. The Service, however, has no plans presently to build new administrative cabins on the refuge under all of the alternatives. Also under all of the alternatives the Service has no plans to advertise the special values of the refuge (see page 202 of the draft plan).

2. Comment noted. There is no requirement for the Service to consult with the people of Old Crow on the development of this plan as they are not American citizens and do not directly use the refuge. However, the Service recognizes the actions it takes could affect the people of Old Crow. We would consult with the appropriate American and Canadian government agencies if the need arises. The International Porcupine Caribou Board was not in existence at the time the draft plan was prepared. The Service will consult with the board in the future. We have eliminated reference to the city of Arctic Village in the final plan.



Alaska Center for the Environment

700 H Street, Suite 4 • Anchorage, Alaska 99501 • (907) 274-3621

April 25, 1988

Bill Knauer
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Re: Arctic Refuge Draft CCP

Dear Mr. Knauer:

The following are the Alaska Center for the Environment's comments on the draft Comprehensive Conservation Plan for the Arctic National Wildlife Refuge.

We are distressed by the Service's failure to adequately protect wilderness values on the refuge. Many refuges Outside have been seriously damaged because wildlife, wilderness and recreational values have had to take second place to economic activities such as grazing. In Alaska the Kenai Refuge's resources have been degraded by oil and gas development. The entire Arctic Refuge, as the Service acknowledges in the draft CCP, is suitable for wilderness designation, yet no additional designations were recommended. We can begin to make up, in part, for earlier mistakes by protecting the entire Arctic Refuge as wilderness. This includes the Coastal Plain, which should have been planned for in the draft CCP. Its omission flaws the entire document, which should therefore be re-done.

Finally, excessive or inappropriate recreational use can also degrade refuge values. We recommend that the Service undertake a study of the refuge's recreational carrying capacity and be prepared to impose any necessary limitations or guidelines.

Thank you for the chance to comment on this draft plan.

Sincerely,

A handwritten signature in cursive script that reads "Cliff Eames".

Cliff Eames
Issues Director

Alaska Friends of the Earth

Box 3847 Anchorage, AK 99510

22 April, 1988

Arctic Refuge Planning Team
U.S. Fish & Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Persons:

We have reviewed the Draft Comprehensive Conservation Plan for the Arctic National Wildlife Refuge and would like to add our support for wilderness designation of refuge lands.

Wilderness designation of the Arctic National Wildlife Refuge would ensure protection of a unique part of our nation's natural heritage. It would provide the highest measure of protection for fish and wildlife in their natural diversity, and the opportunity for continued subsistence uses by local residents -- two of the major purposes established by Congress for the Arctic Refuge.

With regard to these purposes we note that the summary of biological impacts of the alternatives (Table 22) is incorrect. Development activities resulting in habitat degradation will not have the same biological effects as the habitat protection afforded by wilderness designation. For example, you conclude that alternatives B and C, which allow commercial logging, would have the same effect on furbearers as alternative G, which offers the maximum habitat protection. As the negative impact of logging on such furbearers as the martin are well documented, this is obviously incorrect.

Damage to habitat would in turn effect subsistence activities. What are you evaluating when you conclude "no significant restriction of subsistence activities" (Table 23)? Subsistence can not be evaluated based on whether or not the alternatives allow people to hunt, trap, and fish, but on whether or not there will be something there to hunt trap, and fish for. Only wilderness designation ensures habitat protection for fish and wildlife. Any alternative allowing habitat degradation will effect subsistence.

Alaska Friends of the Earth feels that with a few modifications, the alternative which offers the best protection for wildlife and subsistence, as well as the

Alaska Friends of the Earth
Arctic Refuge DCCP
Page 2

other unique natural values for which the refuge was established, is alternative G. With the exception of a few deletions of areas with high use by local Native people, we support wilderness for the entire refuge, including the 1002 area.

The wilderness deletions to Alternative G which we support are:

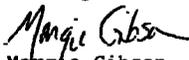
- a five mile corridor on the west side of the East Fork of the Chandalar River to its confluence with the Wind River
- the Wind River Valley below 2,200 feet in elevation to the confluence with the East Fork of the Chandalar
- north of the Wind River, the corridor below 3,000 feet in elevation along the west side of the East Fork of the Chandalar River to the Junjik, and the Junjik River and its tributaries below 3,000 feet in elevation to Timber Lake
- below 3,000 feet in elevation in the East Fork of the Chandalar River Valley from Arctic Village north to Red Sheep Creek (the boundary of the existing wilderness area).
- and
- the four townships which include Old John Lake (R 30 E, R 31 E, T 15 S, T 16 S)

We also feel a high priority of refuge management should be the purchase of development rights and scenic easements of inholdings where development would threaten important refuge values. Such acquisitions should be on a willing seller basis.

We believe local involvement is a key to the success of protecting our natural heritage in the Arctic National Wildlife Refuge. An excellent way to do so would be to have a training program with the goal of filling as many future refuge jobs as possible with local people. You may also wish to examine the successful efforts to involve aboriginal people in management exemplified in several Australian national parks.

In conclusion, we urge you to respect the purposes for which the Arctic National Wildlife Refuge was established, and to reevaluate your support of the no action alternative. We look forward to corrections of your biological and subsistence impacts in the final comprehensive plan.

Thank you for this opportunity to comment.


Margie Gibson
Board Member
Alaska Friends of the Earth

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1. We agree that development activities do not have the same biological effects as wilderness designation, and that logging can adversely affect furbearers. However, with the application of mitigation measures and careful monitoring it is possible to eliminate or minimize many potential adverse impacts. In the case of Alternative B the scenario indicated that only a very small area would be logged. Some impacts would occur in the localized area, which are described in the text of Chapter VI. However, from a refuge-wide perspective the effect on furbearers would be negligible - the same as Alternative G. We therefore believe Table 22, which is a summary table of the biological effects of the alternative, is correct. See also response #2 to the International Porcupine Caribou Commission.
2. Table 23 is only a summary of the assessment. The effects of the alternatives on subsistence, including the effects on subsistence resources, were addressed in Chapter VI (see pages 277-278, 308-310, 325-326, 337-338, 350-351, 362-363, 373-374, and 380-381 in the draft plan). With the possible exception of Alternative B, we do not believe the alternatives would adversely affect important subsistence resources.
3. Comment noted. The text has been modified in the final plan to note that the Service may acquire inholdings from willing sellers under all alternatives. The Service would place high priority on such acquisitions where development would threaten important refuge resources.
4. We agree with your comment. Hiring of local residents is a common management direction in the draft plan for all of the alternatives (see page 212).

ALASKA HERITAGE RESEARCH GROUP, INC.

P.O. BOX 397 FAIRBANKS, ALASKA 99707 PHONE: (907) 479-3180

March 17, 1988

Regional Director
ATTN: Bill Knauer
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

Subject: Arctic National Wildlife Refuge, Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, Wild River Plan (Draft)

Dear Mr. Knauer:

Thank you for the opportunity to review and provide comments on the Draft Arctic National Wildlife Refuge, Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. We hope you will receive our suggestions and criticisms as constructive, as it is in that spirit that they are offered. Our expertise is in the fields of historic preservation and cultural resources management; it is these areas of the draft plans that we wish to comment.

The draft plan (p. 125) presents a poorly researched summary of North Slope pre-history that, while imaginative, draws little on scientific data available today. Perhaps that is why it is so inadequately referenced. If the U.S. Fish & Wildlife Service (USFWS) has concrete archaeological evidence that people utilized "Dall sheep, fish, caribou, wildfowl, bears, moose, berries, and roots" while living on the North Slope 12,000 years ago, these data should be shared with the rest of the scientific community. Further characterization of early post-glacial North Slope people as "relying greatly on caribou for food", and as constructing "stone-walled shelters" is not supported by currently available archaeological data, which in general is scarce for this region of Alaska.

Other portions of the region's prehistory, as presented in the draft plans, are also inaccurate. For example the Denali complex is not a prehistoric culture less than 4,000 years old, as is suggested in the USFWS document, it is defined as being between 8,000 and 10,000 years old. And, the Kavik projectile point is not "generally regarded as diagnostic of northern Athapaskan"; in fact the cultural placement for Kavik remains one of the major unresolved research problems of the region. We might also observe that according to long-standing linguistic convention the spelling is either Athabascan (with a h and c) or Athapaskan (with a p and k).

The facts are that we know little about the early prehistory of the eastern North Slope, in part, because the federal agencies with management responsibilities have not funded necessary research there, making up for the lack of research by presenting fictional accounts such as the one in the draft ANWAR document.

The draft plan states (p. 195) that "All significant historic, archeological, paleontological, and cultural resources on the refuge will be protect as required by law." Then the draft plan goes on to explain that prior to ground disturbance or conduct of economic development activities cultural resources surveys will be conducted, and that appropriate agencies will be consulted. The draft plan does almost nothing to determine how activities allowed in the ANWAR may have an impact on cultural properties, does little to define under what specific circumstances surveys will be required, and does nothing to indicate what specific field and reporting standards will be employed for these surveys. Is there any plan to develop a Programmatic Agreement with the Alaska Historic Preservation Officer and the Advisory Council on Historic Preservation in order to address these issues more fully?

Such a PA, for example, might address the standards for evaluating cultural properties through controlled site test excavation. And it might explain how under alternative G site evaluation can even be conducted, since under that alternative excavation necessary for site evaluation is extremely limited. We suggest that the cultural resources management plan developed for U.S. Army lands in Alaska be used as a model.

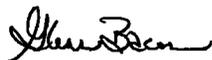
While a Programmatic Agreement may resolve specific problems associated with degradation due to planned development, what of natural degradation or degradation due to unplanned activities. Historic preservation law utilizes the concept of *degradation due to neglect*. The source of this degradation may be natural forces such as erosion and weathering. What plans are there to identify significant cultural properties under the stewardship of the USFWS which may be so endangered?

Other questions we have are:

1. Who retains title to artifacts recovered from 22(g) lands? 4
2. As land transfer constitutes a federal undertaking, and as all federal undertakings require an assessment of their impacts on significant cultural properties (cf. 36 CFR Part 800), will lands nominated for exchange be inventoried for significant cultural properties? 5
3. Why is there no mention of the very important American Indian Religious Freedom Act on page 10, where laws pertinent to cultural resource management are discussed? 6
4. We note in the summary of alternatives (pp. xvi-xxxii) the standard refrain "Negligible effect on cultural resources." Two points need to be addressed here: (1) effects to cultural resources must be considered in terms of the potential to affect the quality or qualities of a cultural property which make it significant, and (2) federal regulation 36 CFR Part 800 requires a determination of either Effect or No Effect. There is no provision for Negligible Effect. As to the first consideration, how is it possible to determine whether or not there will be an effect until the nature of the resource is identified and until the nature of potential impacts is identified? As to the second consideration, cultural properties must be inventoried and specific impacts identified, in order to make the Effect:No Effect determination. 7

Our general reaction is that too little attention has been paid to cultural resource management in the draft document. Section 110 of the National Historic Preservation Act (as amended) clearly requires federal land managing agencies to complete inventories of their holdings in order to identify and provide appropriate protection for significant cultural properties. The draft plan reveals (p. 196) that the USFWS generally plans to accomplish this by encouraging surveys and research on the refuge. However, under alternative G, site evaluation would be actively discouraged. Given the anticipated increase in use of ANWAR for recreational and subsistence activities (p. 29), we think a more active cultural resources management program is needed than is provided in the draft plan. 8

Sincerely,



Glenn Bacon
Research Associate

1. We have deleted reference to the resources cited in the draft plan and reliance on caribou as you recommended. However, the text is correct regarding the stone-walled shelters--these shelters have been positively identified by the Service on the refuge.
2. References to the Denali complex and Kavik projectile points have been deleted in the final plan. We also have changed the spelling of Athabaskan to Athapaskan in the text as you noted.
3. Comment noted. It is not possible or appropriate in this general document to address specific cultural resource surveys and requirements--the refuge comprehensive conservation plan only establishes the Service's general management directions. The questions you raised regarding cultural resources will be addressed in a subsequent detailed cultural resource management plan for the refuge.
4. Artifact ownership in all cases rests with the landowner.
5. Land exchanges, as all other federal actions, will be in compliance with the requirements of the National Historic Preservation Act and its implementing regulations. This may require inventories as discussed in the comment.
6. In response to your comment we have added a reference to the American Indian Religious Freedom Act to the section.
7. The term "negligible impacts" is used in the document as an assessment of overall potential effects rather than specific impacts. This document also does not constitute a determination of effect under the provisions of Title 36, Code of Federal Regulations, Part 800.
8. Comment noted. As outlined on page 195 of the draft plan, the cultural resources of the Arctic Refuge will be managed in accordance with applicable laws and regulations. We agree that a more active cultural resources management program is needed. However, budget, time, and staff constraints, which are beyond the scope of this plan, limit management actions. Regarding Alternative G, this alternative is included in the plan to address the concerns of several conservation groups, and is not the Service's preferred alternative. The plan recognizes that congressional action would be required before this alternative could be fully implemented (see page 250).

Alaska Oil and Gas Association

121 W. Fireweed Lane, Suite 207
Anchorage, Alaska 99503-2035
(907) 272-1481

April 25, 1988

Mr. Bill Knauer
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

AOGA Comments on the Draft Arctic
National Wildlife Refuge (ANWR),
Comprehensive Conservation Plan
(CCP), Wilderness Review and Wild
River Plan

Dear Mr. Knauer:

The Alaska Oil and Gas Association (AOGA) is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. AOGA appreciates this opportunity to comment on the draft ANWR CCP, Wilderness Review and Wild River Plan.

AOGA finds that the plan provides a comprehensive analysis of a full range of management alternatives. We support the FWS in selecting Alternative A as the preferred alternative for refuge management over the near term. We strongly support the position that the preferred alternative not recommend additional wilderness designation. It is extremely important that further wilderness designation in ANWR not be made now before the resource potential of the area may be determined. Alternative A provides appropriate administrative control over management of the refuge while maintaining flexibility with respect to future land use options. Alternative A reflects a proper balance required by ANILCA between preservation and opportunities for other uses consistent with the purposes for which the refuge was established.

Even though we support Alternative A, there are comments we would like to make about the oil and gas activities scenario under Alternative B, commencing on page 289. This scenario has much in common with similar scenarios in other NWR plans on which AOGA has commented. We believe that some of the proposed operations are often impractical and the environmental effects are considerably overstated in many cases. Detailed comments are attached.

Sincerely,



WILLIAM W. HOPKINS
Executive Director

WWR:tp:NS13:1327

ALASKA OIL AND GAS ASSOCIATION

DETAILED COMMENTS
ON
ALTERNATIVE B OF THE
DRAFT ARCTIC NATIONAL WILDLIFE REFUGE COMPREHENSIVE
CONSERVATION PLAN/ENVIRONMENTAL IMPACTS STATEMENT/
WILDERNESS REVIEW/WILD RIVER PLAN

Page 290, "Seismic Studies"

The 9th item states "The seismic energy source would be small dynamite charges placed on boards to avoid boring of shot holes".

Item #11 states "...with shot holes drilled at one-eighth to one-quarter mile ... intervals".

Both techniques would not be required; one or the other would be used. Current seismic technology indicates that shot holes are probably unnecessary in this part of the country. Also the possibility exists that vibroseis would be used in winter.

Page 291, "...exploratory drilling operations"

Items 3 and 4 postulate an entire winter season to prepare a well-site and partially rig up, then have millions of dollars worth of ice airstrips, roads, etc. rebuilt the following winter for well commencement. We believe that any operator experienced in Alaskan or Canadian conditions could move in, rig up, drill and complete an exploratory well on the Porcupine Plateau between December and the end of April.

Item E proposes a camp housing 3 complete crews. Accepted practice is to use 2 crews at 12 hours per day each.

Item 7 has rig components moved in by Rolligon (from where?). It would seem much more efficient to fly the rig directly to the ice airstrip alongside the wellsite, or to use trucks on an ice road between the airstrip and the wellsite, if these facilities cannot be adjacent to each other.

Page 291, "Production"

The last paragraph assumes that a moderate - sized oil field would be discovered, and would be produced for 15 years. We can assure you that in this remote region only a major-sized oil field would be economically feasible. The assumption of 3 well pads (Page 293, item 5), with one production well each is low by a large margin. A more practical estimate would be 4 well pads with perhaps 80 wells, and a more practical field life would be 30 years. Even a field that size would have to be extraordinarily productive to justify a 210-mile pipeline across rough and roadless terrain. Page 294, item 9 confines structures to a 1-square mile production pad. This is an enormous amount of gravel. A 20-acre pad should do the job quite well.

Page 295, "Biological Effects of Alternative B"

4th paragraph: "Additional vegetation alteration could be caused by ice roads and airstrips...." And, "Thus, oil, development would have a major, longterm impact on the project site's vegetation".

Ice roads don't damage vegetation at all, and, as shown by vegetation patterns at Prudhoe Bay, Kuparuk, Swanson River, Beluga River, and Kenai, other indirect effects on vegetation are hardly noticeable and certainly insignificant.

Page 297, Paragraph 1

Despite what Hanley et. al. may have said in 1983, the effects of oil development on fish should be studied where they now occur together. Numerous and ongoing fish studies in the Kuparuk River and Prudhoe Bay area during the past 11 years document no decline in either the numbers or health of the resident fish populations.

Page 297, Paragraph 2

We have commented on several NWR plans about the apparent conviction by USFWS that gravel is washed when mined from floodplains. This is not the case. Gravel is not washed. It is extracted, hauled, and placed. Half of this paragraph details the potential damages from something that can't happen, and we would like to have the USFWS take note of this.

Page 299, Paragraph 3

It is implied that all human activity causes raptors to abandon their nests. The documentation which supports this should be given. If it cannot be documented, the statements should be changed.

Page 300, Last Paragraph, and Page 301

The flat assertion is made that "...activities...would displace that portion of the herd moving into the southeastern portion of the refuge for overwintering". This is unlikely. If the Central Arctic Caribou Herd can carry on their normal activities in the midst of the Kuparuk River Field, the second largest oil field in the U.S., and still increase more rapidly than all the other North American herds, we cannot believe that a field on the Porcupine Plateau would disturb their wintering activities significantly.

1. We have deleted reference to the use of shot holes, as you noted.
2. We have modified the scenario to assume that the exploratory drilling operation is completed within one year, that two crews are used, and that rig components are flown to the ice air strips and then carried by truck over ice roads to the well sites.
3. Comment noted. We recognize that the economic feasibility of this scenario is questionable. The scenario is hypothetical, and is included only for purposes of analyzing and comparing the management alternatives. With regards to the production pads, the assumption is only that production equipment and other related structures would be confined to a 1-square mile area surrounding the production pads - not that the production pad would be a 1-square mile area.
4. Comment noted. We recognize that ice roads would help minimize impacts to vegetation, but ice roads still could result in compaction, late snow melt, and other environmental changes that affect the underlying vegetation. More importantly, this paragraph only includes ice roads and airstrips as one of a series of actions that could alter vegetation. Site clearing for oil facilities, in particular, would have a major, long-term impact on the site's vegetation.
5. Comment noted. We recognize that the oil industry has probably done more studies on potential impacts at the Prudhoe Bay and Kuparuk River fields than in many other fields. However, most of the studies of fishes in these areas have focused on the effects of offshore causeways on fish habitat movements and population structure in coastal waters. The plan is assessing the effects of exploratory activities on inland freshwater fish populations. There have been few development related freshwater studies and baseline (i.e., pre-development) data from freshwater are rare. The text in the draft plan only states possible impacts that could result from exploratory activities.
6. Reference to gravel washing has been deleted from the text as recommended. However, we believe that all the impacts from gravel extraction noted in this paragraph still could occur.
7. We have changed the statement in question to read that although the tolerance of raptors to disturbance varies among species as well as individuals, breeding raptors generally are particularly sensitive to disturbance. Newton (1979) in The Population Ecology of Raptors documents this point.
8. This is a controversial point. Industry, state and federal biologists interpret data in the literature differently and disagree on whether, and to what degree, the Central Arctic Caribou Herd has been disturbed or displaced. It is the opinion of our biologists that the presence of an oil development facility in the wintering area would result in an undetermined number of caribou moving into other portions of the wintering area.

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THE ALASKA WILDLIFE ALLIANCE

P.O. BOX 190953
ANCHORAGE, ALASKA 99519
907-277-0897

April 22, 1988



American Wilderness Alliance

7650 East Amphiphan Road - Suite #4 - Englewood, Colorado 80112 - (303) 771-0380

U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

Dear Mr. Krauer:

The following are the comments of the Alaska Wildlife Alliance on The Arctic National Wildlife Refuge Comprehensive Conservation Plan. We are appalled that the U.S. Fish and Wildlife Service has chosen Alternative A, the "no action" alternative and thus has recommended no additional wilderness designation, despite acknowledging that virtually all of the refuge qualifies for wilderness designation. Our main objection to alternative A is that there is no protection from future development under the current designation. The 1.5 million acre coastal plain, the so-called "1002" area, is essentially excluded from the draft report since Congress currently is debating whether or not to open this area to oil exploration. The southern portion of the refuge, approximately 9.7 million acres, has no designated wilderness, but does contain three designated wild rivers (the Ivishak, upper Sheenjek, and Mind rivers). All of this southern portion qualifies for wilderness designation, according to the report. Also, there appears to be little potential for economic development in this part of the refuge.

Environmentalists and other written comments had overwhelmingly recommended Alternative G, called "The Last Great Wilderness" alternative, with its special provisions to maintain the refuge in a pristine state. The level of use in certain popular areas (such as the Rukhula and Kongsikut drainages and the Antigon Gorge), could be limited in Alternative G to maintain existing wilderness values. In addition, Alternative G would prohibit construction of any permanent administrative research or recreational facilities. It would designate most of the Firth River-Mancha Creek Research Natural area off limits to all forms of mechanization, including aircraft. And Alternative G would be the most economical of the seven proposed alternatives to implement.

The decision to do nothing is consistent with the FWS approach to management plans for the other 15 wilderness refuges in Alaska. This approach appears to be a response to the political demands of the Reagan administration and Alaska congressional delegation. The FWS has attempted to follow the letter of the law by publishing a wilderness review but it has ignored the spirit of the law. To find that 9.7 million contiguous acres of this spectacular refuge qualify for wilderness and to refuse to recommend wilderness for any of this area is an insult to the system requiring wilderness reviews. The FWS has gone through the motions as required, and then made a mockery of the process.

We urge you to select Alternative G, the "last great wilderness" alternative in your final plan. This alternative would provide the maximum amount of wilderness lands in ANWR and would require wilderness designation of all remaining eligible non-wilderness lands outside of the coastal plain. Another important aspect of Alternative "G" is that it would prohibit predator control programs, such as aerial wolf hunting, throughout the remainder of the Refuge.

Sincerely,

Ginny De Vries,
Staff Representative

P.O. Box 100767
Anchorage, AK 99510

13 April, 1988

Mr. Norm Olson
Arctic National Wildlife Refuge Planning Team
U.S. Fish & Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

SUBJECT: Draft Arctic NWR Comprehensive Conservation Plan

Dear Norm,

USFWS's no-Wilderness recommendation for the Arctic NWR is preposterous; and the Draft CCP for the Arctic Refuge is the culmination, in our view, of a badly flawed and development-oriented process that has characterized national wildlife refuge planning in Alaska so far. Since there is very little we can comment on under the circumstances, we simply reiterate our general support for the Last Great Wilderness Alternative.

Sincerely,

David McCargo, Jr.
Alaska Representative

Working Together To
Conserve Wild America

BEAUTY WITHOUT CRUELTY^{U.S.A}

Headquarters
175 West 12th Street
New York, N.Y. 10011
(212) 989-8073

April 23, 1988

Gene Salinas, Vice President
Box 915
Valdez, Alaska 99686

INTERNATIONAL PORCUPINE CARIBOU COMMISSION
P.O. Box 200908
Anchorage AK 99520

COMMENTS ON DRAFT COMPREHENSIVE CONSERVATION PLAN
ARCTIC NATIONAL WILDLIFE REFUGE

Free President
Ar Chief Mammal Hugh Lord Downing

Founder
The Rt. Hon. Muriel Lady Downing

Chair
Ethel Thurston

Vice President
Cleveland Avery
Blanner Cove
William Cove
Helen Jones
Ledy Edward Moraga
Gene Salinas
Dumy Springfield
Lorena Sue
Gretchen Wyle

Chairy No
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U.S. Trademark No
120421

Arctic Refuge Planning Team
U. S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Ms. or Mr.:

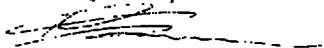
I am writing on behalf of myself and Beauty Without Cruelty's membership of approximately 8,000 individuals. We are opposed to oil and gas drilling in the Arctic National Wildlife Refuge.

We support wilderness designation for the entire refuge and as such support The Last Great Wilderness (LGW) Alternative which is one of several which you are currently considering. It would specify the entire Refuge as wilderness and maximize protection of fish and wildlife populations in their natural diversity with no manipulation.

The public has made it clear that the majority prefer the Last Great Wilderness Alternative. We oppose the current administration's prodevelopment stance as unacceptable and inconsistent with the purposes for which the Refuge was established under the National Wildlife Refuge Administration Act of 1966.

Please reject the "no wilderness" designation and any other plans which would compromise the preservation of wildlife and wilderness values; and adopt the Last Great Wilderness Alternative.

Sincerely,



Gene Salinas
Vice President

cc: Dr. Ethel Thurston
Chair

We appreciate the opportunity to comment on these issues that are so crucial to the future of our people.

(1.) Before commenting on the report itself we must address the issue of Native Allotments. Of 173 applications only 4 have been settled. This is a violation of our peoples rights and should be corrected as a first priority. It is outrageous that you can spend millions for studies, develop and implement plans, and even permit development to occur while our people have waited 20 or 30 years for title to their lands. Many of our old people have died before getting their land and many others will too. We strongly advise you to redirect some of your funding to the appropriate agency to accomplish this, and we will oppose any additional funding for the FWS while this issue remains unresolved.

(2) This report is very prejudicial against the legal rights and way of life of subsistence people in our area. We don't say that this prejudice against our people is done on purpose, but if you look at this report carefully you will see it everywhere.

When the Arctic Range was originally established, one of the purposes was for recreation. When the d-2 bill was introduced this was still one of the main reasons proposed for ANWR (and Kenai Refuge also). Congress changed that. They took recreation out as one of the purposes of ANWR and put in instead the need to provide for subsistence uses. We know because we asked Congress to make the change. Once they understood the issue they agreed without a single objection.

The problem is that everywhere you look in this report subsistence is treated like any other use. Although you list the purposes of the Refuge in the book, including subsistence, almost everywhere else it sounds like subsistence, sport hunting, sport and commercial fishing and recreation will be treated all the same, or even worse. You don't even consider subsistence one of the "significant issues" raised by the public (p.xii). In the charts on "Evaluation of alternatives" (p.393-4), and socioeconomic impacts (p.387-8) you pretend like your responsibility is only to allow our people to go hunting or fishing, not to protect subsistence. The right to go hunting is not

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subsistence without the habitat to support wildlife. For example, Alternative 3 would allow commercial logging on 26% of the refuge. These timbered areas are what support the Martin and other animals that our many trappers depend on, but your chart doesn't show any differences for subsistence users between allowing even large scale logging and protecting the land. You have answered the wrong question in a way that hides the truth about different alternatives for subsistence people. For us the "opportunity to engage in subsistence" means the right to a productive natural environment, as well as the right to hunt, fish, trap etc. This analysis about the different options should be improved. Your failure to recognize the potential for adverse impacts on subsistence people from some of the alternatives

(3) None of the alternatives is really designed around the needs of local people. Our priority is to protect the land and to provide for the other needs of our people including economic development. We recommend that the entire additions to the ANWR be made wilderness except for a few areas that Arctic Village and Venetie use heavily, which should be left as they are without wilderness. These are 1) around Old John Lake, 2) Junjik River from Timber Lake to its confluence with the E Fk. 3) East Fork Chandalar River from about Red Sheep Creek down, and 4) the lower Wind River. These places are like our back yard. They are used all the time for all sorts of reasons, and also include very many allotment sites as well. These areas should be managed so that we can continue without too many problems. One particular issue for these areas is the way you define commercial logging. Sometimes we need logs for a public building. We must be able to pay our people to get logs for a new church or school building or community house or any other important reason without interference. You cannot build a library in Fairbanks without paying workers for their efforts and the same is true up here. Whether or not we can pay someone for a community project, or whether the logs are for a house or a public building shouldn't make any difference, but to be safe, these areas should not be included as wilderness. Logging that is not for local use in our region should not be allowed in any case. The exact boundaries of these areas should be based on the advise of the people in Arctic Village and Venetie.

(4.) In order for our communities to survive over the long term we will need permanent jobs for our people. The FWS plan should include a training program and a goal of filling all future jobs managing these refuges in our area with local people. That would bring more long-lasting benefit to our people than any amount of local logging or mining would ever do, and save money by decreasing the need for public assistance. We are not talking about just temporary tech. jobs, but real full-time management and biologist and clerk

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positions. This could be done with time and a commitment to help our people get the needed skills and training.

(5.) We would also like to point out a few corrections in your report.

--p.149 Ft. Yukon people also use the entire Porcupine River all the way into Canada for subsistence, just like Chalkyitsik. The boundary on your map was probably taken from the state's subsistence study, which is not correct. This is important to us and should be changed.

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--I believe the population estimate for the Porcupine Caribou Herd is now 165,000, not 200,000.

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--p.185. Coordination with other agencies should note obligations of US-Canada PCH Agreement and need to consult with the Canadian Porcupine Caribou Management Board and the new international PCH board that will be formed.

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--p.192. Water rights section should note that the Venetie Reserve has title to the E. 1/2 of the E.Fork Chandalar River, including the water column. This is an important omission that should be corrected.

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--p.397-8 Your estimates of additional funding needs are out of touch with our current federal budget situation and real life. We don't need any more management at this time, or in the near future. What you should do is redirect some of your current budget to approving allotments and for training local people for these jobs in the future, including a plan to move those jobs to local communities.

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--p.403-4. Arctic village is not a city. It is governed by a Village Council, as is Venetie. The Native Village of Venetie Tribal Government is a federally recognized IRA tribal government for both Arctic Village and Venetie. These are three separate governments under federal law.

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Thank you for the opportunity to comment on this important report.

Sincerely,
Jonathan Solomon
Jonathan Solomon, Chair.
3/10/80

Responses to the International Porcupine Caribou Commission

1. Comment noted. While we appreciate your concern regarding the delays in approving the Native allotment applications, the Service does not have the authority to reallocate funds to process the applications. Only Congress and the Secretary of Interior can redirect funding to the Bureau of Land Management to process and approve the allotment applications. We suggest you contact them on this matter.
2. Comment noted. We do not agree with your observation that subsistence is treated like any other use in the plan. The Service recognizes throughout the plan that providing opportunities for subsistence use is a primary purpose of the Arctic Refuge. We acknowledge in the plan the importance local residents attach to their subsistence way of life (see pages 130-131 and 140-141 in the draft plan). The subsistence "common management direction" for all the alternatives, on pages 199-200 of the draft, notes various actions the Service will take to ensure that opportunities for subsistence use are maintained in the refuge. It is true that the Service did not identify subsistence activities to be a significant issue for the plan. But as stated on page 34 of the draft, the reason subsistence is not a significant issue is because the Service recognizes providing opportunities for subsistence use is a primary purpose of the refuge--the Service generally would not permit activities in the plan that would significantly restrict subsistence activities. There is no issue here. We do not believe the tables you referred to only address hunting and fishing. The tables address the effects of the management alternatives on subsistence, not just hunting and fishing. We also recognize the importance of maintaining habitat to support subsistence resources. The discussion of impacts of the alternatives addresses this point (see pages 308-309 and 325-326 in the draft).

It is true that Alternatives B and C would permit commercial timber harvesting on 26% of the refuge, but it is highly unlikely that commercial timber harvesting would occur in most of the area. For purposes of analysis, the Service assessed the effects of a hypothetical small-scale commercial timber harvesting operation in the refuge in Alternatives B and C and determined that it would not significantly restrict subsistence activities. It must be stressed that the alternatives only provide the opportunity for commercial timber harvesting--the Service may permit the use if determined to be compatible with refuge purposes, which includes subsistence. Before the Service would permit any commercial timber harvest operation in the refuge it would conduct a Section 810 determination as required under the Alaska Lands Act. It also should be pointed out that neither of these alternatives were selected as the Service's preferred alternative.

3. We do not believe this concern is warranted. See response #1 to Arctic Village.

4. Comment noted. We have changed the figure title to note that this figure only shows Fort Yukon residents harvest of resources on or near the Arctic Refuge (see response #32 to the State of Alaska). Although Fort Yukon and Chalkyitsik residents may use the Porcupine River in Canada for subsistence as you state, this use is not in the refuge and thus is beyond the scope of this document.
5. The population estimate has been changed as you noted.
6. We have added these two agencies into the text as you recommended.
7. The question of tribal water rights ownership is beyond the scope of the Arctic Refuge plan and cannot be addressed here.
8. Comment noted. The Service believes additional management actions are needed on the Arctic Refuge to fully meet congressional mandates and Service management responsibilities. The refuge's current budget is not sufficient to implement all of the common management directions discussed in the draft plan. Consequently, for all of the management alternatives the Service estimated additional funding and staff would be required. We recognize, however, that federal budget priorities will affect refuge funding and staff, which in turn affect implementation of the management directions (see page 12 of the draft plan). Approving Native allotments is not under the purview of the Service (see response #1). The draft plan notes on page 212 that the Service will, whenever possible, hire local residents for positions on the refuge staff. A portion of the estimated increase in funding may be used for this purpose.
9. As you requested we have changed the text to recognize the Arctic Village council.



National Audubon Society

ALASKA REGIONAL OFFICE
308 G STREET, SUITE 219, ANCHORAGE, ALASKA 99501 (907) 276-7034

Audubon ANWR CCP Comments
April 15, 1988
Page 2

April 14, 1988

Walter O. Stieglitz
Attn: Bill Knauer
U.S. Fish & Wildlife Service
1011 E. Tudor Rd.
Anchorage, AK 99503

Dear Walt:

These are the comments and recommendations of the National Audubon Society on the "draft" Comprehensive Conservation Plan (CCP), and accompanying Environmental Impact Statement, Wilderness Review and Wild River Plan for the Arctic National Wildlife Refuge (Arctic NWR).

Although the CCP describes a wide range of management alternatives for the refuge, and contains a wealth of information of vital importance to future protection and management of the unit, the document is very seriously flawed in a number of ways.

One of the most serious flaws is omission of 1.5 million acres of wildlife habitat and defacto wilderness on the refuge coastal plain from the planning process. When Congress mandated in Section 304(g) of ANILCA that a comprehensive conservation plan be prepared for each national wildlife refuge in Alaska, the key word "comprehensive" was deliberately used to insure that the plan would be all inclusive in its coverage of refuge lands, resources and management problems. Furthermore, the standards set forth by Congress to insure that the CCP's would in fact be comprehensive in nature require the identification and description of "significant problems which may adversely affect the populations and habitats of fish and wildlife..."

How then can the Fish & Wildlife Service justify omitting 1.5 million acres of key coastal plain habitats from the plan when these habitats support some of the refuge's most significant wildlife and wilderness values, and are beset with

the most serious management problems on the refuge, ie. industrial development for oil and gas? This serious omission is unjustified. It's like developing a comprehensive health plan for the body while ignoring a vital organ like the heart. Not only does it make the CCP incomplete, it seriously jeopardizes protection and management of the entire Arctic NWR consistent with the purposes for which it was established.

A second serious problem with the draft CCP is its failure to recommend for designation all lands found suitable as wilderness. When the Arctic NWR was first established in 1960 "to preserve unique wildlife, wilderness and recreation values," it was widely recognized as the most remote and spectacular "defacto" wilderness refuge in the entire National Wildlife Refuge System. By the Service's own admission on page 46 of the CCP:

"The need to preserve a portion of the Brooks Range and arctic Alaska's great wilderness values formed the original basis for establishing the Arctic Range. Unlike many other refuges in the National Wildlife Refuge System, the Arctic Refuge was not established out of a singular need to conserve wildlife. Instead, the refuge was established out of a concern for the wilderness ecosystem of northern Alaska as a whole..."

With reestablishment and enlargement of the refuge by Congress in 1980, together with establishment of the adjacent 2.5 million acre Northern Yukon National Park in Canada in the Yukon Territory, the Arctic NWR now constitutes one of the planet's last vast wild areas. The fact is, the two units together constitute the finest international wilderness sanctuary for arctic wildlife in the world.

Despite the fact the comprehensive planning process affords the Arctic NWR's stewards, the Fish and Wildlife Service, the unprecedented opportunity to recommend how to provide refuge wilderness values the best kind of long term protection possible under the laws of the United States, the Service chooses an alternative that would maintain the status quo. Rather than recommend wilderness designation for all suitable refuge lands as the law intends, the wildlife require, and conservationists desire, your agency is recommending "minimal management" instead. This represents nothing less than a bureaucratic cop-out on its responsibilities and the wishes of its primary constituents, the state and national conservation communities.

Such bureaucratic jargon as "minimal management" is simply a smoke screen for leaving agency management options open. Unfortunately, in doing so, it also leaves the refuge vulnerable to the wide range of incompatible activities that threaten the very natural values the refuge is intended to protect. To rely

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instead on so-called "compatibility" testing pursuant to the National Wildlife Refuge System Administration Act of 1966 as somehow a substitute for wilderness, is planning in the dark. One merely need examine the record of the Service's compatibility testing on national wildlife refuges throughout the country to be convinced that in far too many cases it has become a practically meaningless exercise in protecting refuges from incompatible developments.

Our specific recommendations for developing a preferred alternative in the final CCP for the Arctic NWR are as follows:

1. Include the 1.5 million acres of omitted coastal plain habitats in the planning process.
2. Recommend that all suitable refuge lands be included in the National Wilderness Preservation System.
3. Remove administrative facilities on Peters/Schrader Lakes. They do not constitute "minimal tools" necessary for management of the Arctic Wilderness, and in fact intrude on the pristine qualities of one of the most scenic and popular public use areas in the refuge.
4. Conduct human carrying capacity studies for recreationists, and commercial guides and outfitters.
5. Limit the number of outfitters and guides based on carrying capacity studies, and place them under renewable permits.
6. Initiate bid-and-prospectus requirements for new outfitting and guiding business permits.
7. Prioritize all private inholdings for acquisition or the negotiation of conservation easements.
8. Encourage wilderness oriented research consistent with ethical standards designed to protect wildlife, wilderness and cultural values.
9. Publish and distribute to visitors a brochure on wilderness ethics, ie. how to use and enjoy the arctic wilderness without degrading it.
10. Commit to cooperative management of the Arctic NWR with the Northern Yukon National Park under an "International Cooperative Management Agreement".
11. Remove the unnecessary structures at Elusive Lake and the upper Junjik River Valley, and rehabilitate abandoned DEW line sites along the coast.

This is now the 15th refuge CCP that we have commented on over the past four years. Much careful study, thought and a great deal of time was devoted to this effort. Our input was intended to be constructive and helpful with the ultimate aim being to help the Fish & Wildlife Service achieve the high purposes for which each national wildlife refuge in Alaska was established. Yet, as we review our many comments and compare them with the final CCP's that have been released, we find that few if any of the major recommendations that we made were responded to very well. It makes one wonder if they were even read by key agency decision makers let alone given serious consideration!

The extensive set of comments that we provided in the scoping process for the Arctic NWR plan is a classic example. In reviewing the draft CCP, we find that essentially none of the major recommendations that we provided at public scoping meetings, and in our 14 pages of written comments of May 5, 1986 and February 9, 1987 were ever addressed in the draft CCP. We are therefore resubmitting them with this correspondence in hopes you will reconsider them.

Recommendations on wilderness are a case in point in terms of your responsiveness. Despite the fact the National Audubon Society along with 77% of all other participants in the two year scoping process, as well as the Service's professional managers, recommended wilderness designation for all suitable refuge lands, the draft CCP calls for "no wilderness". Such unresponsiveness makes a mockery of the planning process and turns it into an expensive and time consuming paper shuffle. Even worse, it does great damage to the reputation and credibility of both the Fish & Wildlife Service and the Department of the Interior.

In closing, I would like to offer a few words of caution as your agency continues planning for the future of the Arctic NWR. By choosing to ignore the wishes of the majority of participants in the refuge planning process, thwarting congressional intent on achievement of refuge purposes, and by leaving the Arctic NWR vulnerable to incompatible developments, the Fish & Wildlife Service runs risk of doing irreparable damage to its image as the principal steward of this nation's rich wildlife and wilderness heritage on national wildlife refuges. Should agency credibility be allowed to slip away, with it will go public support. And without public support, agency programs cannot succeed in the long term.

So I urge Fish & Wildlife Service leaders to demonstrate more courage in your decision making. Reconsider your professional, legal, and social responsibilities by supporting the sound recommendations of your best managers and the majority

Audubon ANWR CCP Comments
April 15, 1988
Page 5

Responses to the National Audubon Society

of public respondents. Under our democratic system of government you are obligated to do so, rather than pursue what you judge to be a politically expedient course of action. Above all else, don't further endanger your agency's already seriously damaged credibility by placing some of the last great wildlife and wildland spectacles remaining on the planet at any greater risk than they already are.

Your consideration of these comments and recommendations is greatly appreciated.

Sincerely,



David R. Cline
Regional Vice President

cc: Liz Raisbeck, National Audubon Society
Brock Evans, National Audubon Society
Alaska Audubon chapters
Other Conservation Organizations

1. We disagree with this point. The "1002" area has not been left out of the refuge comprehensive conservation plan. As stated several times in the draft plan (see the "Dear Reader" letter and "Notice to Reader" at the beginning of the document, pages 37, 179-180, 203, and 262), the Service is treating the "1002" area as a minimal management area. This is how the Service is presently managing the area. As you are aware, Congress is presently debating the future management of the "1002" area. It is not appropriate for the Service in this plan to anticipate what actions Congress might take in the "1002" area, including permitting oil and gas development or designating the area as wilderness. Therefore, in the interim under all of the alternatives the Service will continue to manage the "1002" area under minimal management. All of the management activities in Table 9 of the draft plan and the "common management directions" apply to the "1002" area. The Service also assessed the "1002" area in the "Environmental Consequences" chapter as a minimal management area. If Congress directs the Service to manage the "1002" area otherwise, the Service will modify the plan appropriately. Should Congress take action to require additional studies or a wilderness review of the "1002" area, they will be undertaken and completed at that time. See also response #1 to the Citizens' Advisory Commission on Federal Areas.
2. Comment noted. Congress designated 8 million acres as wilderness in the Arctic Refuge when it passed the Alaska Lands Act. Section 1317 of that Act requires the Service to study the suitability of the remaining non-wilderness portion of the refuge for inclusion in the National Wilderness Preservation System. Although all of these lands were determined to be suitable for wilderness designation, the Act does not require the Service to propose any or all of the non-wilderness lands for wilderness designation. As stated on pages 203-204 of the draft plan, the Service was guided in the development of the wilderness proposal in its preferred alternative by two criteria. These criteria were based on the Service's interpretation of the intent of Section 101(d) of the Alaska Lands Act. For the Arctic Refuge it was determined that the non-wilderness lands did not meet these criteria. No known threats to refuge resources south of the Arctic Wilderness presently exist; potential future threats can be addressed through the Service's existing management policies and regulations. Resource development would not be permitted on lands designated as minimal management areas. We thus believe that minimal management would adequately protect refuge resource values and still leave the agency with future management options.



Working for the Nature of Tomorrow

NATIONAL WILDLIFE FEDERATION

1412 Sixteenth Street, N.W., Washington, D.C. 20036-2266 (202) 797-6800

Mr. William Knauer

April 28, 1988

Page 2

FEDERAL EXPRESS

April 28, 1988

Regional Director, Attention: Mr. William Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, Alaska 99503

Re: Draft Arctic National Wildlife Refuge Comprehensive
Conservation Plan, Environmental Impact Statement, Wilderness
Review, and Wild River Plan (Plan)

Dear Mr. Knauer:

The National Wildlife Federation (NWF) welcomes this opportunity to comment on the above-captioned Plan. The NWF is the country's largest conservation-education organization, with over 5 million members and supporters. With these comments, we continue the long-standing involvement of the NWF in conservation issues concerning Alaska.

The NWF has an intense interest in the future of the Coastal Plain (1002 area) of the Arctic National Wildlife Refuge (Refuge). The 1002 area provides many critical needs for large numbers of animals during their annual life cycles. While the Plan does not directly address oil and gas development for this area because these are evaluated elsewhere (Department of Interior, 1987, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment, Report and Recommendation To The Congress Of The United States and Final Legislative Environmental Impact Statement (EIS)), we reiterate that the NWF does not agree with the Secretary's recommendation contained in the EIS. We refer you to the NWF's Report to the United States Congress (March, 1987, The Arctic National Wildlife Refuge Coastal Plain: A Perspective for the Future) for our complete comments on management of the 1002 area.

Alternative A, preferred by the U.S. Fish and Wildlife Service (Service), is the "no action" alternative for management of the Refuge. However, alternative A provides little clear direction for the Refuge Manager and the Service to affirmatively dealing with increases in current uses and potential new uses of the Refuge. By selecting alternative A the Service is restricting its own ability to assertively manage the Refuge according to the purposes for which it was originally established. The Alaska National Interest and Lands Conservation Act specifies that one purpose for which the Refuge was established was "to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including the participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling" (Section 303(2)(B)(i)).

To successfully achieve this and other objectives for which the Refuge was established, the NWF recommends alternative E. Alternative E, among other actions, proposes the addition of 8.5 million acres to the wilderness system and would provide clear direction to the Refuge Manager and the Service as new activities threaten to impact and change the Refuge. The limited potential for resource extraction compatible with the major purposes for which the Refuge was established makes alternative E the logical alternative. Furthermore, alternative E will provide the necessary protection to ensure the intent of Congress, as specified in the Alaska National Interests and Land Conservation Act, is met.

Thank you, again, for this opportunity to review and comment on the draft Plan for the Arctic National Wildlife Refuge. We look forward to the U.S. Fish and Wildlife Service's action on the draft Plan.

Sincerely,

Douglas B. Inkley, Ph.D.
Wildlife Resource Specialist
Fisheries and Wildlife Division

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April 25, 1988

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Walt,

This letter responds to your memorandum of 8 January 1988 requesting comments on the draft Comprehensive Conservation Plan/Environmental Impact Statement (CCP/EIS) for the Arctic National Wildlife Refuge. We appreciate the opportunity to offer our comments and urge that you give them serious consideration.

As you are well aware, the history of development on the North Slope of Alaska has been one committed to the exploitation of petroleum resources. As a consequence, nearly all of the region has been marred to varying degree, most prominently by the thousands of miles of seismic trails and winter roads stretching across the tundra, but including airstrips, drilling pads, access roads, and other infrastructure of the industry; much of this damage persisting from activities in the late 1940's and 1950s. In sharp contrast, the establishment of the Arctic NWR stemmed from the fact that this small part of the arctic was essentially unaltered, and from the concern of many conservation organizations, and prominent scientists and conservationists that this area be preserved as a completely natural ecosystem, i.e., as wilderness. This focus clearly differs from that forming the basis for establishment of nearly all other National Wildlife Refuges which is the important wildlife resources they sustain. This historical difference provides the basis for many of our comments. While development of petroleum resources is often compatible with requirements for protection of wildlife resources, it is unlikely ever to be compatible with the preservation of esthetic, scientific and other values of natural ecosystems and wilderness areas.

While the planning staff is to be complemented for doing a good job of compiling background information, we believe that the draft plan is lacking in that it does not provide definitive information or a rationale for support of the preferred alternative. This deficiency has persisted throughout the CCP/EIS effort, although the NWRA has frequently stated need for substantive explanation and justification of different alternatives, particularly the preferred alternative, before the NWRA can provide its endorsement.

The primary issue emanating from the planning process concerns the amount of lands deemed suitable for designation as wilderness. The NWRA believes that the Alaska National Interest Lands Conservation Act (ANILCA) is consistent with the Public Land Order that estab-

lished the Arctic NWR, and, as required by Section 305 of ANILCA, such orders must remain in force except to the extent they are inconsistent with the Act. Considering this, and the original purpose of the refuge, it seems clear that virtually all of the Arctic NWR should be recommended for designation as a Wilderness Area, the most effective protection possible. To commit these lands to a less protective status because of perceived uses in an uncertain future is inappropriate to this occasion. Your reliance on the "minimum management" label that has no statutory authority is a feeble tool to lean on in light of the powerful industrial and political interests that will continue to promote development of this area.

Aside from the wilderness issue, another concern of our organization is the omission of the 1.5 million acre 1002 Area from consideration in the draft CCP/EIS. Although we are aware of the problems that including this area might pose, to develop a so called comprehensive plan for so prominent a refuge without including the refuge's most important wildlife habitat seems unjustified, and not what Congress intended. Alternative management policies or programs for this area can be developed that would be contingent on actions that might be taken by Congress. If that is deemed impossible, it may be more appropriate and practical for your agency to request a deferral of the final CCP/EIS until such time as Congress has determined a suitable course of action for this vital part of the refuge. Maintaining the 1002 area in "minimal management" as proposed, may be appropriate as a temporary measure, but better protection should be given to the area as soon as possible.

In reviewing prior CCP/EIS documents, we repeatedly expressed our concern for the use of the management area classification system as applied in the planning process. Given the preeminent concern for preservation of wilderness and scientific values as indicated by the historical record, the diverse but interdependent ecosystems within the refuge, and the year-round requirements of caribou, the principal species, area designations seem inappropriate, and to the extent possible, the refuge should be managed in a holistic manner to maintain the integrity of these exceptional values.

Sincerely,


Charles A. Hughlett

Responses to the National Wildlife Refuge Association



Northern Alaska Environmental Center

218 DRIVEWAY
FAIRBANKS, ALASKA 99701
(907) 452-5021

1. Comment noted. We believe Chapter VII in the draft plan provided adequate information on the rationale for the selection of the preferred alternative. The reasons why the Service selected Alternative A were stated on page 399.

We must stress that the selection of a preferred alternative is not based on the number of people who write us supporting a given alternative. As noted on page 392 of the draft plan, many groups have differing views on management of the Arctic Refuge, and no single alternative probably would satisfy everybody. It is important to us, however, that the preferred alternative satisfy the majority of the issues and concerns raised by the public. We still believe Alternative A satisfies a majority of the concerns raised by the public regarding protection of refuge resources and prohibiting resource development. Although a majority of those individuals and groups commenting on the draft plan favored additional wilderness in the refuge, we do not believe this is necessarily the best approach to managing the refuge. Keeping refuge lands under minimal management we believe would accomplish the things people have asked for, without having to rely on Congressional action. Minimal management also maintain options for the Service to address management needs that may arise in the future. See also response #2 to the National Audubon Society.

2. Comment noted. The Service disagrees that Public Land Order 2214 and the Alaska Lands Act require that all of the Arctic Refuge be recommended for designation as wilderness. Unless the refuge plan is revised, the Service would not permit economic developments in the minimal management areas. See also response #2 to the National Audubon Society and response #5 to the Alaska Northern Environmental Center.
3. See response #1 to the Citizens' Advisory Commission on Federal Areas and response #1 to the National Audubon Society.

April 20, 1988

Regional Director, Attention Bill Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, Alaska 99503

Dear FWS:

This letter constitutes the comments and recommendations of the Northern Alaska Environmental Center on the draft Arctic National Wildlife Refuge Draft Comprehensive Conservation Plan (CCP).

For the record, the Northern Center strongly opposes the U.S. Fish and Wildlife Service's (FWS) proposed alternative "A" and it's concomitant no more wilderness recommendations, and we support Alternative "G", the Last Great Wilderness Alternative.

Briefly, the Northern Center views this draft plan and it's proposed alternative as seriously flawed in a number of respects.

* The plan excludes the so - called "1002" area of the coastal plain on the grounds that Congress will decide the future management of the 1.5 million acre area.

This violates Section 304(g) of ANILCA, which mandates that refuge plans be "Comprehensive" in scope and identify "significant problems which may adversely affect the populations of fish and wildlife...". There is no justification for the Fish and Wildlife service to arbitrarily exclude 1.5 million key acres of vital coastal plain habitat and de-facto wilderness with the excuse that some other report has been prepared on the area.

The plan gives only cursory attention to the potentially devastating effects of the cumulative impacts of state and federal off-shore oil and gas leasing, on-shore support facilities, water and gravel supplies for off-shore oil and gas leasing and oil and gas leasing in surrounding areas, as well as potential impacts from right of way development. The Northern Center feels that the plan is fatally flawed in this

562

1
2
NA

respect.

To ignore the "significant problems" presented by proposed major oil development on the key wildlife and wilderness values of the refuge as a whole is at least mendacious, and, as it seriously jeopardizes protection and management of the entire refuge according to law, quite possibly illegal.

A glaring omission in the plan is any serious consideration of those subsistence users and neighboring areas which will be most affected by the egregious agenda implicit in this plan. The subsistence users of the Dominion of Canada, which the FWS may have noticed shares one hundred miles of boarder with the Arctic National Wildlife Refuge, constitute 80% of the Porcupine Caribou harvest. The Porcupine Caribou Management Board opposes development in ANWR. The government of the Yukon Territory opposes development of ANWR. In conjunction with the 2.5 million acre Northern Yukon National Park, which the FWS may have noticed lies immediately adjacent to ANWR, we have right now the greatest international wilderness arctic wildlife sanctuary in the world. For the FWS to ignore the impacts of their actions on those areas and peoples where they will indeed be the greatest, and to pretend as though Canada doesn't exist, only underscores the many shortcomings of this feeble document.

* The proposed "status quo" alternative A violates the intent and purposes for which the refuge was established, and is inconsistent with the FWS own selection criteria. In poring through this 550 page document, we found the actual criteria cited as the basis for choosing among the various alternatives buried on page 384.

1. "To what extent does the alternative satisfy the purposes of the refuge and other provisions of the Alaska Lands Act?"
2. " To what extent does the alternative satisfy the issues and concerns of the public? "
3. " The relative costs of implementing the alternatives also were examined in the evaluation of the alternatives. "

An impartial examination of the facts in the public record show that the FWS has failed miserably to follow even these broad criteria in the selection of its preferred alternative, imposing instead what appear to be political criteria from above, rather than sound management guidance from agency personnel, the existing legislation, and the public.

The first of these criteria appears fairly straightforward. The National Wildlife Refuge Administration Act of 1966 requires that uses of Refuge lands must be found "Compatible" with the purposes for which individual refuges were established. Page 46 of the CCP acknowledges that "Unlike many other refuges in the National Wildlife Refuge System ...the refuge was established out of a concern for the wilderness ecosystem of northern Alaska as a whole ..."

The purposes of the Arctic Refuge as stated in ANILCA are to

1. Conserve fish and wildlife populations and habitats in their natural diversity...";
2. Fulfill international treaty obligations of U.S. with respect to fish and wildlife;
3. Provide for environmentally consistent subsistence use and;
4. Insure water quality and quantity in the refuge.

In addition, the public land order (PLO 2214) that established the Arctic National Wildlife Range on December 6, 1960 specified that its purpose was to preserve "...unique wildlife, wilderness and recreational values..." (emphasis added).

Alternative "A" clearly does not best meet these criteria.

Alternative "A" reads that "With revisions to the plan, the Service could develop areas for increased public use or economic uses that would not protect wilderness values." In other Alaska refuge plans "minimal management" does not necessarily prohibit oil and gas exploration and development under ANILCA. This is not consistent with the purposes for which the refuge was established.

We note here that while there is an extensive chart - table #25 - which purports to "evaluate" the alternatives relative to refuge purposes, the agency very cleverly has avoided ranking the alternatives against those purposes, instead relying on relatively vague and verbose language to justify it's management agenda.

Wilderness designation for the entire refuge is the best means to manage the area consistent with the purposes for which this vast wilderness refuge was established.

THE PLAN FAILS TO MEET NEEDS AND CONCERNS OF THE PUBLIC.

The draft plan's second espoused selection criterion concerns public input. For two years the FWS conducted an extensive public involvement program on the CCP. Numerous public meetings were held and 162 written comments were received. According to the agency's own statistics, 77% of the written comments supported the "Last Great Wilderness Alternative" (LGW) - Alternative G, which was proposed by the Northern Alaska Environmental Center and other conservation groups. As a matter of fact, only twelve responses favored a no-wilderness alternative. FWS planners stated that they had never received such total support for any alternative on any refuge plan done in Alaska.

With an overwhelming 87% of the concerned public supporting all wilderness in the refuge, how can the agency's preferred "no wilderness" alternative purport to satisfy it's own criterion to "best meet the needs and concerns of the public?"

Once again, if the public response to the alternatives had been ranked by FWS against the alternatives, Alternative G, the Last Great Wilderness Alternative would have been shown to be the overwhelming choice of the public and the draft plan as it now stands is fatally flawed in this respect.

Finally, we come to the third of these alternative selection criteria. On page 397 we find a table which displays the relative costs of implementing the various management alternatives. Alternative G, The Last Great Wilderness Alternative, is far and away the most economical for the Government, in these times of increasing budget constraints and the spectre of tax increases, to implement. Thus while the agency states that the benefits to the local economy of the preferred no-wilderness alternative would be identical to the Last Great Wilderness alternative, the FWS ignores it's own criterion in light of the fact that alternative G is the most economical and instead arbitrarily chose a costlier approach.

Once again, the plan is fatally flawed in that the selection of the preferred alternative is not consistent with it's own stated mandates and criteria.

It is the position of the Northern Alaska Environmental Center that the facts overwhelmingly support Alternative G,

the Last Great Wilderness Alternative. This is the only alternative being considered by the FWS which would specify the uncompromised protection of the physical and ecological integrity of the refuge and maintain it's wild and undeveloped character.

In the process of developing the Draft CCP, the planning team and ANWR staff initially recommended wilderness for the entire refuge. The ultimate 180° switch to a "No wilderness" recommendation is entirely a political call by the FWS Regional Director, under the auspices of the Department of Interior and the Reagan administration in Washington, D.C.

The problems with the ANWR CCP are symptomatic of an agency which has ignored its professional, legal, and social responsibilities, making a mockery of the planning process. The public is not unaware of the fact that the recent series of refuge plans have all displayed an obvious pro-development bias absolutely inappropriate for an agency such as the FWS.

We would caution and entreat the FWS to seriously consider the consequences of so blatantly following the Watt "no more wilderness" agenda, ignoring the majority of public participation, ignoring congressional intent, and seriously jeopardizing refuge values under the guise of this plan.

If the FWS wishes to maintain some degree of credibility, the very serious issues raised above must be addressed and the agency must return to a professional, rather than a political, agenda and deal with the public and the law in good faith.

We urge you to display courage by making the tough decision and giving this priceless ecosystem the protection it requires.

Your consideration of these comments and recommendations is greatly appreciated.

Sincerely,


Rex Blazer
Executive Director

Responses to the Northern Alaska Environmental Center

1. See response #1 to the National Audubon Society and response #1 to the Citizens' Advisory Commission on Federal Areas.
2. Comment noted. It is not yet known what oil and gas development will occur in or near the Arctic Refuge--many possible scenarios could be developed, with differing time frames, locations of developments, and numbers of developments. The Service cannot adequately analyze these scenarios in the refuge comprehensive conservation plan. See also response #35 to the State of Alaska.
3. Comment noted. The Service is not proposing any actions in this plan that would adversely affect subsistence users in Canada. In the scenario for Alternative B (which is not the Service's preferred alternative, and which would take congressional action to implement) only limited impacts are projected to occur in the Porcupine caribou herd's wintering range--some caribou may be displaced from the oil development project area, but they still would use adjacent areas. There is no reason to believe that this development would adversely affect Canadian subsistence users. See also response #2 to Arctic Village.
4. Comment noted. We disagree with your assertion that Alternative A violates the intent and purposes for which the refuge was established. There are no management actions proposed under this alternative that would be inconsistent with the purposes of the refuge. As noted in Table 25 in the draft plan, this alternative would fully meet the purposes of the refuge. Minimal management would maintain the area's wilderness values, as indicated on pages 279-283 of the draft plan.
5. Comment noted. Under the provisions of the National Environmental Policy Act the Service is obligated to provide opportunities for public participation in the development of the Arctic Refuge Comprehensive Conservation Plan. However, Congress delegated responsibility for management of the refuge to the Service under the provisions of the Alaska Lands Act and the National Wildlife Refuge Administration Act. As the land manager, it is up to the Service to best determine how to satisfy both the needs of the resource and the American public. It is true that most of the comments the Service received supported additional wilderness in the Arctic Refuge. The Service appreciates these comments, but it must be stressed that the selection of a preferred alternative is not based on how many prefer a given alternative.

The Service believes that designating all of the non-wilderness portions of the refuge as minimal management areas would adequately protect the refuge's resources and best meet the needs of local residents, refuge users, and the general public in the long-run. We should point out that minimal management is the most restrictive administrative category the Service could assign to the refuge, and any changes to allow economic developments could only occur through the National Environmental Policy Act process. See also response #2 to the National Audubon Society and response #1 to the National Wildlife Refuge Association.

6. Comment noted. As stated on page 384 of the draft plan, the Service used two primary criteria in its selection of a preferred alternative; cost of the alternatives was not one of these criteria. The relative costs of the alternatives were included in this section as another factor to be considered in evaluating the alternatives. The cost figures on pages 397-398 in the draft are only estimates and should not be considered in the same light as the two primary criteria--the Service would not select an alternative as its preferred alternative just because it was cheaper to implement. Alternative A is neither the cheapest nor the most expensive of the alternatives considered.



Resource Development Council

for Alaska, Inc.

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April 20, 1988

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Mr. Walter Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

re: Arctic National Wildlife Refuge Draft CCP/EIS/WR/WRP

Dear Mr. Stieglitz:

The Resource Development Council appreciates the opportunity to comment on the Draft Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review and Wild River Plan for the Arctic National Wildlife Refuge.

The Resource Development Council for Alaska, Inc. is a statewide private development organization. Its members come from all economic sectors--business, labor, local government, universities and a wide range of statewide associations. RDC focuses on the most serious economic challenges facing Alaska.

The Council recognizes that some of the most formidable roadblocks to the state's development--and these affect all economic sectors--are regulatory, tax and land use policies. RDC's board, staff, division directors and thousands of members work diligently to assure that the state's development policies create a favorable business climate.

RDC would like to compliment the Service, particularly the planning team, for the efforts taken to increase the range of alternatives reviewed in the Draft CCP. At the Alternative Identification stage the planning process seemed focused on only one alternative (designated Wilderness) to the status quo (Minimal Management). The incorporation of two additional alternatives (B and C) presents a much more balanced opportunity for public scrutiny and comment.

The Resource Development Council generally supports the Fish and Wildlife Service's preferred alternative, Alternative A. We believe the study and analysis of Alternatives B and C have substantially demonstrated that more active management regimes for refuge resources are not necessary during the ten to twenty year life of this plan. Minimal management strategies, as identified in Alternative A, are the most efficient and responsive available to the Service at this time.

Mr. Walter Stieglitz
April 20, 1988
page 2

The issue of Wilderness designation is particularly important to RDC. We agree that the near-term future of the refuge is not likely to demand a great deal of intensive management. It is clear the vast majority of the land will remain "wild" for the foreseeable future. This, however, does not justify a recommendation by the Service to designate Wilderness in ANWR.

The long-term restrictions inherent in a Wilderness recommendation are inappropriate. In this early stage of ANWR's evolution as an element of the National Wildlife Refuge System, Wilderness designation would unduly restrict future options.

The Resource Development Council thanks you and your team for the hard work and energy that have clearly been dedicated to this planning effort. We especially appreciate the attitude of the planning team as they have responded to our concerns throughout the process.

Sincerely,

RESOURCE DEVELOPMENT COUNCIL
for Alaska, Inc.



Becky L. Gay
Executive Director



SIERRA CLUB
Alaska Chapter



The Alaska Chapter of the Sierra Club would like to comment on the draft management plan for the Arctic National Wildlife Refuge, submitted by the U.S. Fish and Wildlife Service. Our comments will be limited largely to the wilderness review conducted by the FWS.

We vehemently oppose alternative A, the "no action" alternative chosen by the FWS for managing the refuge. Excluding the 1.5 million acre coastal plain (1002 area), some 9.5 million acres currently not protected by wilderness designation were reviewed by the FWS for their wilderness eligibility. Virtually all of this land, which is in the southern and southeastern part of the refuge, meets the criteria for wilderness, according to the draft report. Nevertheless, the FWS recommended that none of these 9.5 million acres be designated

wilderness. The FWS states that selection of alternative A "would maintain the option of changing management of the non-wilderness portion of the refuge to provide for compatible economic uses." The area would be placed under the "minimal management" category but would not be given the protection from future development afforded the 8 million acres of the refuge north of it. This outrageous decision would leave this part of America's wildest ecosystem unprotected from future development schemes such as those proposed by the oil companies and their Interior Department friends for the Arctic coastal plain.

Four of the seven alternatives considered included designation of considerable portions of the remaining land as wilderness. Written comments, in fact, overwhelmingly supported alternative G, the "Last Great Wilderness" alternative, which designates all of the remaining refuge wilderness, with special provisions to maintain the refuge in a pristine state. While we realize that the FWS must base its decision on more than popular sentiment, the failure to recommend any wilderness at all is an insult to the many people who took the time to participate in the planning process. There were several compromise positions available among the seven alternatives, but even these were not chosen.

"Not blind opposition to progress, but opposition to blind progress."

We support alternative G, the "Last Great Wilderness" alternative, for this crown jewel of the refuge system, and urge the FWS to reconsider its decision. This alternative is most consistent with the expressed purpose of the refuge, and, as the report points out, would still allow subsistence activities and traditional forms of recreation while affording maximum protection to the environment. In addition, alternative G appears to be the cheapest of the seven considered. The FWS predicted that implementation of any of the other alternatives would require budget increases from 66% to 94%, with an increase of 80% predicted for the chosen alternative, A. However, implementation of G would increase the budget by only 52%, according to the FWS estimate.

The decision to do nothing is consistent with the FWS approach to management plans for the other 15 wildlife refuges in Alaska, recommending little or no additional wilderness designation. This approach does not appear to us to be a coincidence, but, in fact, a carefully orchestrated response to the political demands of the Reagan administration and Alaska's congressional delegation. The FWS has attempted to follow the letter of the law by publishing a wilderness review, but it has ignored its spirit completely. The decision on Arctic National Wildlife Refuge wilderness was made nominally by the FWS, and in reality by the anti-environmental administration and its allies. To find that 9.5 million contiguous acres of this spectacular refuge qualify for wilderness and then to refuse to recommend wilderness for any of this area is, in essence, a rejection of the system requiring wilderness reviews. The FWS has gone through the motions as required, and then made a mockery of the process with a predictable and absurd outcome.

Once again, we urge you to reconsider this disgraceful and totally political decision, and recommend alternative G in the final plan.

Steve Livingston
Steve Livingston, M.D.
Alaska Chapter, Sierra Club
Executive Committee
March 24, 1988

Tanana Chiefs Conference, Inc.

201 First Ave.
Fairbanks, Alaska 99701
(907) 452-8251

April 19, 1988

Arctic Refuge Planning Team
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Planning Team Members:

The Tanana Chiefs Conference, Inc. would like to take the opportunity to comment on the draft ANWR "Comprehensive" Conservation Plan at this time. The Tanana Chiefs Conference, Inc. is a Native, nonprofit service organization serving 43 villages in the Alaskan Interior. Several of our villages use the Refuge land and resources as an integral part of their subsistence economies.

We object to the term "comprehensive" as part of the plan's title, because 1.5 million refuge acres on the Coastal Plain are left out of the plan. In this respect, the plan fails to take into account the synergistic effects of various development scenarios in the 1002 area as would be appropriate for a plan of this type. The 1002 report is largely a political document that certainly does not take our villages' subsistence concerns into account. While the report details possible effects on Kaktovik's subsistence economy, the document merely states that the economies of our villages would likely be affected, period, no further investigation and discussion of the matter. In short, the ANWR conservation plan should look at all potential significant activities that affect the refuge as the National Environmental Policy Act requires.

The Tanana Chiefs Conference, Inc. supports the position taken by the International Porcupine Caribou Commission:

- a) The entire additions to the ANWR should be classified as Wilderness except for heavy subsistence use areas. These are 1) around Old John Lake; 2) Junjik River from Timber Lake to it's confluence with the E. Fork; 3) East Fork Chandalar River from about Red Sheep Creek down; and 4) the lower Wind River. This would be consistent with the purposes for which the refuge was established and would be the least costly management scheme.
- b) The Native Allotment applications in the Refuge must be settled.

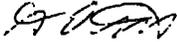
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- c) The plan should include a training program and a goal of filling the management jobs for the Refuge with local people.
- d) The plan fails to recognize the potential for adverse impacts on subsistence in several scenarios. Subsistence is treated equal to or less than other uses in the plan when the Refuge purposes establish protection of subsistence uses as a priority.

We do not feel that the Preferred Alternative A is the best management scenario from the economic perspective of our villages or of the United States Government. It is not the most consistent alternative with the purposes for which the Refuge was established. The Tanana Chiefs urges the planning team to reconsider a modification of Alternative G as the preferred alternative.

Sincerely,

TANANA CHIEFS CONFERENCE, INC.


Mitch Demientieff
President

Enc.

cc: The Honorable Don Young
The Honorable Ted Stevens
The Honorable Frank Murkowski
Senator John Binkley
Representative Kay Wallis

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Trustees for ALASKA

April 25, 1988

Mr. Walter O. Stieglitz
United States Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Attn: Bill Knauer

Dear Mr. Stieglitz:

The following comments are submitted on behalf of Trustees for Alaska in response to the draft Arctic National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review and Wild River Plan ("the draft Plan"). Overall we find the draft Plan to be a completely inadequate environmental impact statement, an insufficient planning document, and completely lacking in justification for the selection of Alternative A as the preferred alternative for the Arctic National Wildlife Refuge ("the Refuge").

Rational decisions affecting natural resources of international significance in sensitive areas need to be based on adequate information. The United States Fish and Wildlife Service ("FWS") has unfortunately failed to include important information on the region's resources, failed to integrate the analysis of the effects of development of the coastal plain area of the refuge, and has improperly applied its own criteria in the development and selection of Alternative A, the "current situation" alternative. In light of this, Trustees urges you to issue a revised draft of the Plan, rather than a final Plan, taking into account the comments which have been submitted and additional information which should be gathered and analyzed before any final decision is made.

I THE PLANNING PROCESS IS INVALID WITHOUT ADDITIONAL INFORMATION

The introduction to the Plan states that:

"The first step in developing a comprehensive conservation plan for the Arctic Refuge was to collect information. Field inventories, remote sensing and literature searches produced information about refuge resources an uses."

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This procedure is mandated by section 304(g) of the Alaska Lands act which sets forth the standards to be achieved in the development of comprehensive conservation plans for national wildlife refuges in Alaska. Specifically, the Secretary of Interior is required to identify and describe (A) populations and habitats of the fish and wildlife resources of the refuge, (B) the special values of the refuge, (C) areas suitable for administrative and visitor facilities, (D) present and potential requirements for access with respect to the refuge, and (E) significant problems which may adversely affect the populations and habitats of fish and wildlife identified and described in the planning process.

Yet, in direct contradiction to the Plan's stated procedure and the requirements of the Alaska Lands Act, the draft Plan was prepared without adequate information on the resources in the refuge. For example, the Plan itself acknowledges that, while intensive studies of various resources on the refuge's *coastal plain* were conducted in preparation of the 1002 Report, "for the rest of the refuge (about 17.5 million acres) the database is not sound." (ANWR Draft Plan p. 31.) The Plan further recognizes its failings:

"Additional information is needed about fish and wildlife populations, their habitat requirements, and their sensitivity to disturbance a south of the 1002 area for effective management of the refuge in the future. Information on existing public, subsistence and economic uses of the refuge, and resulting impacts is particularly scarce. Adequate research and monitoring are required to record baseline conditions, determine management needs, assess potential impacts, and determine actions needed to minimize or avoid impacts." (ANWR Draft Plan p.31)

There is no justification or excuse offered for the failure of the FWS to conduct the adequate baseline studies, determine management needs and assess potential impacts prior to completion of the draft Plan. While it is true that the specific refuge management plans to be developed in the future will provide further refinement of the overall plan, it is essential that the *comprehensive plan* give baseline information and make informed choices among alternatives, to give adequate direction to the specific management plans which will follow.

A specific example of this deficiency is in the area of water quality analysis, and its impact upon fish species. The Plan states that under all alternatives, the Service

will provide a high level of protection to major and minor drainages that sustain both resident and anadromous fish species, and that the service will "maintain water quantity and quality to ensure that fish populations are maintained in their natural diversity." (ANWR Draft Plan p.190) Yet, the Plan states unequivocally that "water quality information for much of the Arctic Refuge is sparse." (ANWR Draft Plan p. 75.) The Plan states that the FWS is currently conducting baseline studies on water quality parameters and instream flow rates for the refuge's drainages, yet that information is not available now, at the decision-making stage. The decisions about the comprehensive planning direction of the the refuge are, therefore, being made in absence of adequate data. The large quantities of water needed for coastal plain oil and gas exploration and development will definitely impact the rest of the refuge, perhaps by necessitating pipelines for water transportation from other areas of the refuge, by displacing wildlife due to decreased water availability on the coastal plain, and/or by increasing subsistence activities in other drainages if the coastal plain area is no longer viable for subsistence activities. In the absence of baseline data on current water quality and quantity, it is impossible to analyze impacts and select an alternative which will "maintain water quality."

Similar information vacuums exist in the areas of air quality, ("data on air quality of the Arctic Refuge have not been collected." ANWR Draft Plan p. 59); and public use ("Reliable annual public use date for the Arctic Refuge are not available." ANWR Draft Plan p. 150).

II
THE CHOICE OF ALTERNATIVE A IS
INCONSISTENT WITH FWS' OWN CRITERIA

The evaluation criteria which the FWS used in selecting Alternative A as the preferred alternative is set out in Chapter VII. The three criteria used are: 1) to what extent does the alternative satisfy the purposes of the refuge and other provisions of the Alaska Lands Act 2) to what extent does the alternative satisfy the issues and concerns of the public and 3) the relative costs of implementing the alternatives.

The choice of Alternative A is unsupportable in light of these criteria. The purposes of the refuge and the provisions of the Alaska Lands Act as cited by the Plan do not dictate the "minimal management" alternative. In fact these purposes (to conserve fish and wildlife populations

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and habitats, to fulfill international treaty obligations, to provide the opportunity for subsistence, to ensure water quality and water quantity within the refuge) dictate that the best way to fulfill these purposes is by managing the refuge as wilderness, as alternative G proposes.

The differences between Alternatives A and G are that the following activities will not be permitted in G, but will be allowed under A:
1) mechanical manipulation for habitat improvements
2) administrative facilities/structures
3) permanent fish passes, weirs, spawning channels
4) permanent fish hatcheries
5) permanent physical and chemical habitat modifications
6) core sampling
7) seismic studies

There is an inadequate explanation and justification as to how permitting the activities listed above better promotes the purposes of the refuge than alternative G, which prohibits these activities.

The Plan analyzes the "wilderness suitability" of the refuge areas south of the 1002 area known as the Porcupine Plateau Unit and the Brooks Range Unit (ANWR Draft Plan p. 160-165). The conclusion is that these areas meet the seven criteria which the FWS used in evaluating the wilderness qualities of the refuge. Yet, the FWS declines to implement this analysis by designating these areas as wilderness and offers no explanation or justification for the failure to adopt the wilderness designation.

Finally, given the fact that the petroleum potential of the area is low (as the Plan states at p. 71) there must be some articulated reason for selecting an alternative which allows seismic studies for oil and gas potential to be conducted. The FWS has offered none.

The second criteria established by FWS, that of satisfying the issues and concerns of the public, dictates the selection of Alternative G, also. The Plan acknowledges that 66% of those expressing a preferred alternative in the public workbooks urged the "Last Great Wilderness" alternative (ANWR Draft Plan p. 537), and the list of concerns offered at public hearings overwhelmingly supports the selection of Alternative G.

The third criteria used by FWS, an evaluation of the costs of administration, again supports the selection of Alternative G. Table 27 amply demonstrates that Alternative G is the least costly alternative and that Alternative A

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ranks as the third most costly alternative. From an economic standpoint, the selection of Alternative A is not justified.

The primary justification for the adoption of Alternative A which appears throughout the Plan is the fact that this alternative will allow the "maximum flexibility and options for change". However, the Plan itself states repeatedly that the Plan should be viewed a dynamic document that will be reviewed and updated periodically. In addition, there is a mandate that every 3-5 years the plan will be updated and research conducted to allow for revisions, with a full review every 10-15 years. With this high degree of flexibility in the Plan, there should be no need to pick an alternative merely because it preserves options and allows flexibility for change. The FWS must make choices and manage the Refuge, not preserve options.

III

THE "SIGNIFICANT ISSUES" ANALYSIS IS SERIOUSLY FLAWED

The Plan attempts to define issues which the FWS considers "significant" for refuge management and wilderness designation. The criteria used for this determination were allegedly drawn from the National Environmental Policy Act regulations. However, the justifications for significance or non-significance of issues are thinly veiled attempts to justify the FWS selection of Alternative A, rather than accurate reflections of "significance." By defining an issue as not significant, the FWS eliminates the possibility that the issue will have negative environmental consequences, before any environmental analysis is performed.

For example, the Plan states that the Plan will not have a significant impact on oil and gas development in the 1002 coastal plain area, nor on whether the 1002 area should be integrated into the Plan. The rationale for these determinations is as follows: because Congress will make the decision as to whether or not oil and gas leasing is appropriate for the coastal plain, the Congressional action precludes the FWS from having any impact on the decision to permit oil and gas exploration and development.

On the other hand the FWS states that the Plan will have a significant impact on oil and gas activities south of the 1002 area. Congress, again, would have to make a determination for oil and gas development to be allowed in areas south of the 1002 area, since section 1003 of the Alaska Lands Act prohibits oil and gas development. Yet, the Plan reasons, that the possibility of conducting oil and

gas studies south of the 1002 area elevates this to a significant issue. It is difficult to understand how the full scale development of the 1002 coastal plain area (with Congressional approval) will have a less significant impact on the refuge than the possibility of oil and gas studies south of the 1002 area.

Other areas which the FWS erroneously considered "not significant" are subsistence activities, habitat improvements, transportation and utility corridors.

With respect to the significant issues for wilderness designations, the Plan language is contradictory and confusing. First, the Plan makes the erroneous assertion that the FWS would manage the fish and wildlife in a wilderness in the same way that it would in a non-wilderness area. (ANWR draft Plan p. 40.) This statement is contradicted throughout the Plan in the discussions of habitat modifications, permanent fish passes, weirs, spawning channels, mechanical manipulation for habitat improvement, effects of mining and oil and gas activities. Furthermore, if it is true that the FWS would manage the fish and wildlife in wilderness areas in the same way as the non-wilderness areas, it seems that it would be administratively simpler to make the entire refuge a wilderness, rather than part wilderness, part non-wilderness.

The Plan states that the wilderness designation would not have a significant effect on fish and wildlife populations and habitats (Plan p. 40) but that the Plan will have a significant effect on "wilderness values" (Plan p. 41). Perhaps these two are obviously distinguishable to the FWS, but to the public this appears as contradictory doublespeak. What is the "wilderness" if not the habitat of fish and wildlife populations? How can the fish and wildlife habitat be not significantly impacted by the Plan, when the "wilderness values" are? The revised draft should clarify or revise this confusing and contradictory analysis.

IV

THE USE OF "COMPATIBILITY ANALYSIS" IS NOT SPECIFIC

Throughout the Plan there is reference to activities which will be permitted "where compatible with Refuge purposes." For example, under the preferred alternative, Alternative A, oil and gas studies will be permitted where compatible with Refuge purposes. The Plan states that the compatibility analysis will be conducted in accordance with the FWS Refuge Manual. (ANWR Draft Plan p. 182) Yet, a reference to the Refuge Manual states that compatibility will be determined

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in accordance with the more specific refuge management plans. Our concern is that without direction in the comprehensive plan as to what will be considered compatible uses, or some guidance as to areas of compatibility, the specific refuge plans will not have a comprehensive and consistent approach to the "compatibility" test. We urge you to develop guidelines in the Plan which provide direction for the future refuge management plans with respect to compatibility.

V

THE ENVIRONMENTAL ANALYSIS IS INADEQUATE

The exclusion of the coastal plain from the environmental analysis is a significant deficiency in the Plan. While it is true that the 1002 Report analyzed various impacts of oil and gas development on the coastal plain, nowhere in that document, nor in this Plan, is there an analysis of the cumulative impacts of development, exploration, seismic studies, mining or core sampling on the refuge, wilderness values, subsistence, or the myriad of other aspects of refuge life which are impacted by such activities. In fact, the "Cumulative Effects" portion of the 1002 Report states that cumulative impacts are specifically not fully addressed because the 1002 report focused on a specific resource area and specific questions raised by Congress. (1002 Report at p. 200) It is in this comprehensive plan, the programmatic planning document for the Refuge, that a full cumulative impacts analysis must occur. In addition, an analysis of the cumulative impacts of support facilities for offshore and nearshore oil exploration is necessary. The failure of the Plan to perform a cumulative impact analysis violates the provisions of NEPA.

A confusing aspect of the Plan is its failure to conduct any environmental analysis of certain impacts which are, by law, permitted in the refuge. For example, transportation and utility systems are cursorily addressed (ANWR Plan p. 208) with no indication of what types of utility systems might be necessary, the location of potential corridors, nor of the environmental impacts of potential transportation and utility systems.

The lack of any accurate environmental information on air quality, water quality, and public use (see discussion in I above) renders the environmental analysis useless. However, the paucity of environmental background information did not deter the FNS from making "assumptions" (page 263-264) for use in the environmental analysis regarding the issues of water quality, air quality and public use and further, to analyze the environmental consequences for each alternative based upon these "assumptions". This approach defies logic.

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If FWS has no data or scarce data, the formulation of assumptions based on this lack of data is ridiculous, and the analysis of environmental effects based on these assumptions carries this illogical method analysis to an incomprehensible extreme. The Plan must be revised to reflect an accurate picture of the environmental impacts, including cumulative impacts, based on accurate assumptions.

VI

ADDITIONAL COMMENTS

1. The Plan states that carrying capacity studies are controversial, yet they are essential to any Plan which purports to promote the maintenance of water quality, fish and wildlife populations. We urge you to conduct such studies before making any management decisions.
2. The Coastal Consistency Analysis is completely inadequate. The 1002 Report did not, as the Plan suggests, adequately address the coastal consistency issues. Therefore, the revised Plan must conduct a thorough coastal consistency analysis.
3. The Plan fails to honor the purposes of treaties and international agreements. The Plan must include input from the Porcupine Caribou Board; measures to prevent and abate pollution or detrimental alteration of habitats (such as oil spill contingency guidelines); measures to ensure compliance with the Polar Bear Treaty, since polar bear denning sites will potentially be affected.
4. The Plan fails to recommend the addition of the 28-mile segment of the Sheenjek river, to the Wild and Scenic Rivers designation. This would be an ideal addition to the system and would make a complete management unit of the Sheenjek. This recommendation should be considered.

Conclusion

Trustees for Alaska urges you to incorporate these comments, and those submitted by the Wilderness Society, the Northern Alaska Environmental Center, the Audubon Society, the Sierra Club, Friends of the Earth, and the Alaska Center for the Environment, and to prepare a revised draft Plan,

Responses to Trustees for Alaska

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incorporating all of these comments.

Very truly yours,



NANCY S. WAINWRIGHT
Staff Attorney
Trustees for Alaska

cc: Sierra Club, Friends of the Earth, Alaska Center for
the Environment, Audubon Society, Wilderness Society,
Northern Alaska Environmental Center

1. We disagree that this plan fails to meet the requirements of Section 304(g) of the Alaska Lands Act. It is true that this plan was prepared without all of the information the Service desires on the Arctic Refuge's resources and users. As the plan stated, additional information is needed for effective management in the future. The Service has a firm commitment in all of the alternatives to conduct studies and research necessary to obtain essential data (see the research "common management direction" on pages 186-187 of the draft). It can be argued, however, that the Service may never have the information it needs to manage all aspects of the Arctic Refuge, given the size of the refuge and the Service's resources. Furthermore, Congress mandated that the Service prepare a comprehensive conservation plan for the refuge within a specified time period. The Service completed the draft plan using the best available information. The Service believes sufficient information is provided in the plan to make a decision on which management alternative to select. As knowledge of the refuge's resources and users improves, the Service may need to revise the plan (see page 12 of the draft plan). Subsequent reviews and updates of the plan will have the benefit of more data on water quality and quantity and public use. With regards to water quality, the statement quoted on page 190 of the draft is a management direction the Service will implement to the best of its ability, using the best available information. Under all of the alternatives it is the intent of the Service to maintain the Arctic Refuge's water quality (see pages 191-192 of the draft). The potential effects of coastal plain oil and gas development on refuge water quantity you cited are not appropriate for this plan--under the Service's preferred alternative the "1002" area would be managed as a minimal management area and oil development would not occur.
2. Comment noted. The first five management actions cited are addressed in Table 9, on pages 167-177, and for Alternative A on page 216 in the draft plan. Mechanical manipulation for habitat improvements may be considered in minimal management areas in Alternative A, but the plan would have to be revised and the area where this activity is proposed would have to be changed to another management category (i.e., moderate management) before it could be permitted (see page 169). Administrative facilities/ structures would be permitted under Alternative A so the Service can better manage the refuge's fish and wildlife populations and users and thus assure that refuge purposes are achieved; temporary facilities, provided for under Alternative G, may not always be sufficient. With regards to the fisheries development facilities, these developments may be permitted in minimal management areas under Alternative A on a case-by-case basis, and would be subject to the provisions of the National Environmental Policy Act and a compatibility determination. It should be stressed that under Alternative A all of these actions will not necessarily occur. As noted on page 216, under Alternative A habitat improvements generally would not occur. The Service also does not foresee the need to build new permanent administrative facilities in the refuge at this point in time. Rather, the alternative provides the Service with the option in the future to carry out these actions should the need arises to maintain fish and wildlife populations within the refuge; under Alternative C the Service would not have these options.

With regards to core sampling and seismic studies, these uses of the refuge would not promote the purposes of the refuge. However, under the provisions of the Alaska Lands Act and the National Wildlife Refuge Administrative Act the Service may permit activities in the Arctic Refuge so long as they are compatible with the purposes of the refuge. As noted on page 176 of the draft plan these uses may be permitted in minimal management areas in Alternative A, subject to special use permit conditions. The Service does not believe these short-term uses, with stipulations, would necessarily conflict with refuge purposes.

3. Comment noted. The question in this section is not the degree of impact resulting from development of the "1002" coastal plain versus oil and gas studies south of the "1002" area. As pointed out on page 37 of the draft plan, development of the coastal plain is not a significant issue because the 1002(h) report addressed this issue and Congress is presently considering what action to take. In all of the alternatives in the refuge comprehensive conservation plan the "1002" area is treated as a minimal management area, pending congressional action, in which oil and gas development would not be permitted. Although the Arctic Refuge is closed to oil and gas development, the Resource Development Council for Alaska requested that we include an alternative in the plan that would permit oil and gas exploration and development south of the "1002" area. The 1002(h) report did not address this possibility. To fulfill the requirements of the National Environmental Policy Act, the Service must examine a full range of alternatives for the refuge in the refuge plan, including the possibility of oil and gas activities occurring south of the Brooks Range. Any recommendation the Service makes in this regard would be highly controversial. It is for this reason that the Service considered oil and gas activities south of the "1002" area to be a significant issue.

4. Comment noted. We disagree with your assertion.

- 5 We agree that the statement on page 40 was misleading and have clarified the text to read as follows: One of the primary purposes of the Arctic Refuge, under Section 303 of the Alaska Lands Act, is to conserve fish and wildlife in its natural diversity. Section 4(a) of the Wilderness Act states that the designation of wilderness within a national wildlife refuge must supplement the purposes for which the refuge was established. Therefore, wilderness designation would not prevent the Service from achieving the purpose of conserving the refuge's fish and wildlife populations. Regardless of whether or not additional wilderness is designated in the Arctic Refuge, the Service will manage the refuge to conserve fish and wildlife populations in their natural diversity, on a refuge-wide basis.

In non-wilderness portions of the refuge, such as minimal management areas, the Service could permit several of the management actions you noted. However, these actions would only be permitted on a case-by-case basis, and would be subject to the provisions of the National Environmental Policy Act and a compatibility determination--none of these actions would necessarily occur. Furthermore, the Service would only permit these actions under strict conditions. It also should be pointed out that the Service has not identified the need for any of these actions

in the Arctic Refuge in the foreseeable future. Finally, you should be aware that even in wilderness areas these management actions could be permitted in a management emergency if they were identified to be the minimum tool.

6. Comment noted. It is true that fish and wildlife habitats are one part of wilderness values. But the Service distinguishes between fish and wildlife populations and habitats, which can be objectively measured and managed, and wilderness values. It is possible, for example, that a permanent fishery development would be proposed outside of an existing wilderness area to conserve the refuge's fish and wildlife habitat. This development could be permitted, although it would significantly impact existing wilderness values at that site. As noted above, the Service is mandated to conserve fish and wildlife populations and habitats in their natural diversity, regardless of whether additional wilderness is designated in the Arctic Refuge. Therefore, from the perspective of maintaining fish and wildlife values, wilderness designation is not a significant issue--the Service has no latitude on what actions it can take here. Wilderness values, however, are a subjective, intrinsic quality that the Service does not have the same mandate to protect outside of the existing wilderness area.
7. With regards to our treatment of the "1002" area in the refuge comprehensive conservation plan, see response #35 to the State of Alaska, #2 to the Northern Alaska Environmental Center, #1 to the Citizens' Advisory Commission on Federal Areas, and #1 to the National Audubon Society. With regards specifically to support facilities for offshore facilities, under the Service's preferred alternative these facilities would not be permitted--under both minimal management and the existing Arctic Wilderness, offshore support facilities would not be permitted on the refuge's coastal plain. However, as noted on page 38 of the draft plan, when Congress acts on the future management of the "1002" area it could permit this development on the refuge. Also, if the support facilities are part of a transportation system they could be permitted under provisions of Title XI of the Alaska Lands Act.
8. Comment noted. We disagree that the refuge plan failed to adequately address transportation and utility systems. As stated on page 36 of the draft plan, no specific proposals have been made to build such corridors through the refuge. (The 1002(h) report addressed the effects of potential transportation corridors in the refuge if oil development occurs in the "1002" area.) Until the need for such a system is identified, it is not possible for the Service to evaluate the types of utility systems needed, the location of potential corridors, or the potential environmental impacts of the system. Under Title XI of the Alaska Lands Act the Service would permit the proposal if it was determined to be compatible with refuge purposes and no economically feasible and prudent alternative route existed for the system.



THE WILDERNESS SOCIETY

April 25, 1988

Regional Director
Attn: Bill Knauer
Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

RE: Arctic National Wildlife Refuge Draft
Comprehensive Conservation Plan

Dear Sir:

The following comments are submitted on the Arctic National Wildlife Refuge Draft Comprehensive Conservation Plan (CCP) on behalf of The Wilderness Society's 220,000 members nationwide, including 1,300 in Alaska. For more than 50 years, the Society has been committed to the wise management of all the federal lands and the preservation of wilderness.

Inadequate Planning Effort

The draft CCP can hardly be considered a "comprehensive" management plan, for it omits the 1.5 million-acre Arctic Coastal Plain, the 1002 area. According to the Coastal Plain Resource Assessment, or 1002 Report (p.46), "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity."

"Incorporation by reference" of the 1002 Report is no substitute for proper consideration of the coastal plain. The 1002 Report is a resource assessment intended to persuade Congress to open the area to oil development. It is not a land management plan. The draft CCP states (p.154), "The 1002 area has not yet been included as a part of this planning process, pending a management decision by the Congress." However, satisfied with the status quo, Congress may never pass legislation concerning the Arctic Refuge. Surely it does not make sense for the Fish and Wildlife Service (FWS) to await a day that may never arrive.

ALASKA REGION

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The Wilderness Society
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Section 304(g) of the Alaska National Interest Lands Conservation Act (ANILCA) calls for a comprehensive management plan for the entire refuge, not one that arbitrarily excludes a critical part of the refuge. By refusing to integrate the coastal plain into the draft CCP, the FWS has fallen woefully short of fulfilling the Congressional mandate to produce a comprehensive plan.

The FWS should issue a new draft CCP that includes alternatives addressing management of the coastal plain under a range of the foreseeable scenarios. These alternatives should include wilderness, exploration, and full-scale oil development. Not only must the FWS address management of the coastal plain under these circumstances, but the alternatives must examine and plan for the impacts these scenarios would have on the rest of the refuge. If the FWS will not reissue the draft CCP, then, at a minimum, a supplement to the draft plan should be prepared for public comment.

Inadequate Wilderness Recommendation

Once again, The Wilderness Society must protest the agency's "no-more wilderness" policy that has resulted in another indefensible wilderness recommendation. In the case of the Arctic Refuge, the failure of FWS to recommend any additional wilderness out of the 9.7 million acres found suitable for wilderness designation is unacceptable and inappropriate. The Society urges the repeal of the March 12, 1985 policy directive that set new criteria for the agency's wilderness recommendations in Alaska. The criteria violate the letter and spirit of both the Wilderness Act and the Alaska Lands Act.

The FWS has added insult to injury by its complete disregard of the 1002 area in the wilderness review process. According to the 1002 Report (p. 46), "With the exception of two abandoned DEW Line sites on the coast, the entire 1002 area meets [the] criteria [of the Wilderness Act]. The coastal plain in its present state has outstanding wilderness qualities: scenic vistas, varied wildlife, excellent opportunities for solitude, recreational challenges, and scientific and historic values."

The intent of Congress in the Alaska Lands Act was to provide a mechanism to add lands suitable for wilderness protection to the National Wilderness Preservation System. It is obvious that Congress would not have called for the comprehensive wilderness review process of Section 1317 if it had considered its own review adequate or if it believed sufficient wilderness had already been designated. Nevertheless the FWS has chosen to ignore Section 1317. The entire refuge is quintessential wilderness and more than meets the statutory criteria for inclusion in the wilderness system.

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The intent of Congress is clear: if the land is suitable, it should be recommended.

Inadequate Wilderness Management Planning

The Arctic Refuge is the crown jewel of the National Wildlife Refuge System and should represent the high water mark in refuge wilderness management.

The Arctic Refuge was established not only out of the need to protect important wildlife, but primarily out of a concern for the wilderness ecosystem of northern Alaska as a whole. Wilderness management is the highest and best use of these extraordinary lands and must be considered comprehensively on its own. It should not merely arise as a vague coalescence from piecemeal planning for the various purposes and activities on the refuge. Furthermore none of the goals for the refuge would be compromised by wilderness management. To the contrary, wilderness promotes refuge goals by protecting, among other things, fish and wildlife populations, recreational, historic and scientific values. Finally, wilderness protects the resources that are the foundation of the local subsistence economy and the traditional Native cultures.

Absence of Necessary Data and Research

Research data on the Arctic Refuge, with the exception of the coastal plain, is woefully lacking. In fact, ninety percent of all funding for the refuge has gone to the 1002 area while virtually nothing has been spent on the rest of the refuge. Recently, for example, \$2 million was appropriated for research in the 1002 area on caribou migration, snow geese staging areas, water quality and quantity, and fish movement along the Beaufort Sea coast. The FWS lacks baseline data on fish and wildlife populations, water resources and terrestrial and freshwater environments for the rest of the refuge.

The best comprehensive research in the refuge, outside the 1002 area was conducted by Olaus Murie, but those studies culminated in the 1950's. Since the studies conducted in the early 1970's regarding possible routing of a gas pipeline across the Arctic Refuge, little research has been conducted. Planning for and management of the other 18 million acres of the refuge necessarily suffers from the absence of a long-term, comprehensive approach to research. Before a true comprehensive conservation plan can be completed, the FWS must conduct basic baseline research south of the 1002 area.

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Megatrade

Conspicuously absent from the draft CCP is any discussion of the "Megatrade" being proposed by the Interior Department and six Native corporations. How can Interior propose to trade away 166,000 subsurface acres of the Arctic Coastal Plain, yet not consider such a major impact worthy of consideration in the comprehensive plan?

Inholdings

One of the greatest long-term threats to the wilderness qualities of the refuge is the potential development of inholdings. While current landowners use their lands largely for traditional purposes compatible with the refuge, the possibility exists that lands could be subdivided and sold or otherwise developed in a manner incompatible with the purposes of the refuge. The service should develop a land protection plan that sets priorities for those inholdings, the inappropriate use or development of which would threaten refuge values. Conservation easements or sale of development rights should be negotiated with landowners on a willing seller basis as opportunities arise.

Facilities

Facilities undermine the naturalness and sense of isolation from civilization that the Arctic Refuge represents. Buildings attract and concentrate use, detract from scenic values, and are unnecessary for wilderness management. Appropriate management of the refuge should utilize temporary structures and seasonal camps. Existing unnecessary structures, such as those at Peters Lake, should be removed. Sub-sistence cabins which are not in use should be removed. Construction of new cabins for Fish and Wildlife Service administrative purposes should be prohibited. Similarly, the construction of onshore facilities to support state offshore oil leases is a wholly inappropriate use of refuge lands and should be prohibited. Structures at Elusive Lake and the upper Junjik River valley should be removed and the abandoned DEW Line sites along the coast should be rehabilitated.

Recreational Use

The Fish and Wildlife Service is to be commended for their support of nonconsumptive recreation and their recognition of the need to control recreational use of the Arctic Refuge. Restraint must be employed, as many areas in the refuge have the potential for overuse and subsequent resource damage. The fragile nature of arctic ecosystems simply cannot withstand intensive use. Carrying capacity studies should be prepared and applied in the comprehensive plan. If necessary, limits should be placed on use in certain areas,

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to protect both the land and the visitor experience. The number of outfitter/guide operations should be limited, based on carrying capacity studies and strict environmental standards, under a renewable bid and prospectus permit system.

Visitors to the Arctic Refuge expect to encounter a pristine, untrammled wilderness. The number of visitors that can genuinely experience wilderness at any one time is finite. The Society urges the service to focus their efforts on maintaining the exceptional opportunities for solitude and primitive recreation. Even wilderness becomes crowded, as evidenced by the popularity of such places as Arrigetch Peaks and the North Fork Koyukuk River in Gates of the Arctic National Park.

The Society supports actions to minimize impacts, including regulation of access, changes in state hunting or fishing regulations, limited aircraft access, limits on the size and number of recreational group visits, limits on commercial guiding activity, and interpretive and educational programs that sensitize wildlife and wilderness resources. The Society supports the service's intent to avoid advertising or promoting the refuge. The preservation of extraordinary values requires an extraordinary management approach.

Public Access and Transportation Management

The use of helicopters should be prohibited, except under extremely limited circumstances, such as for emergencies and for research purposes where no alternate means of access exists. All other uses of helicopters, administrative or otherwise, are inappropriate. Minimum height regulations (1500 ft. AGL) for aircraft should be established for aircraft throughout the refuge.

Management of Fish and Wildlife Habitat and Populations

The Service's management objective regarding wildlife should be to maintain natural distribution, numbers composition and interactions of all indigenous species and, to the greatest extent possible, to allow natural processes to control the ecosystem. Artificial manipulation of habitat and wildlife populations undermines the refuge's natural integrity and should be prohibited. The appropriate tool for ensuring maintenance of natural diversity is control of hunting and fishing activities. The draft CCP states, "the term natural diversity reflects an intent to maintain the flora and fauna on the refuge in a healthy and natural mix, and not to emphasize management activities favoring some species to the detriment of others." Predator control and other habitat manipulation for the benefit of sport hunters should be prohibited.

Research efforts should be wilderness-oriented, consistent with ethical standards designed to protect wildlife, wilderness and cultural values. There is absolutely no excuse for incidents such as those that occurred on June 25, 1987 near Simpson Cove and July 2, 1987 in the vicinity of Marsh Creek (as reported by Tom Walker in correspondence dated July 5, 1987). Both incidents involved apparently needless harassment of wildlife by Fish and Wildlife Service personnel and helicopters.

The FWS should place greater emphasis upon law enforcement activities. Aerial wolf hunting and "same day airborne" hunting are among violations that occur in the refuge due to inadequate law enforcement presence in the refuge.

Economic Use Management

At present, the only consumptive commercial activity in the refuge is guided hunting. Under minimal management, the service "could develop areas for increased public use or economic uses that would not protect wilderness values." The Society urges wilderness designation of the entire refuge to prevent threats to refuge values. Oil and gas leases and production of oil and gas are not compatible with the purposes of the refuge and should be prohibited. All commercial development should be prohibited in the refuge.

Timber Harvesting

In an apparent attempt to justify minimal management, rather than wilderness management for those lands found suitable for wilderness designation, the service has concocted a proposal for commercial timber harvesting. While acknowledging there have been no specific proposals, the FWS includes this possibility "to fulfill National Environmental Policy Act (NEPA) requirements." Commercial timber harvest in the Refuge is neither feasible nor economic and, therefore, is totally unjustifiable even as a hypothetical scenario. Moreover NEPA does not call for inclusion of unrealistic scenarios simply because a request for such a fantasy is made by some organization.

Mining Operations

Acquisition of the nine mining claims in the refuge should be a top priority. Validity and value determinations are a necessary first step to establishing a willing seller/buyer environment. No mining occurs at present; thus, there could be no better time than the present to acquire these claims. Fee acquisition of these parcels will contribute to resource protection, enhancement of scenic values and maintenance of wilderness.

International Biosphere Reserve

The Arctic Refuge, along with the adjoining 2.5 million-acre Northern Yukon National Park in Canada, constitute the world's largest international wilderness sanctuary for arctic wildlife. In 1982, The Wilderness Society recommended nomination of the Arctic Refuge and Northern Yukon National Park as an International Biosphere Reserve. However Interior's development-at-all-costs position on the Arctic Coastal Plain appears to have thwarted any efforts to so designate these areas. The Society wishes to know whether the Fish and Wildlife Service has determined the suitability of these areas as a Biosphere Reserve? If these sites do qualify, why have they not been recommended? The Society further recommends nomination of the Arctic Refuge as a World Heritage Site.

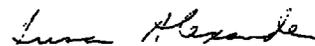
Finally, the Fish and Wildlife Service should commit to cooperative management of the Arctic Refuge and Northern Yukon National Park under an international cooperative management agreement.

Conclusion

In this time of huge federal budget shortfalls, wilderness designation is our country's best investment. The draft CCP itself points out that wilderness in the Arctic Refuge is the least costly management scenario. For example, the alternative that allows for the most development would require a 94% increase in federal funding and 12 additional permanent staff; the management option to designate the entire refuge as wilderness would necessitate a 52% increase and 6 additional permanent staff.

As a national benchmark of naturalness, ecological integrity, scenic beauty and exceptional wilderness opportunity, the Arctic Refuge stands alone. The Wilderness Society urges wilderness designation for the entire refuge.

Sincerely,



Susan Alexander
Regional Director

- 9
1. We disagree that the refuge plan failed to consider the "1002" area and therefore failed to fulfill congressional mandates. As was stated several times in the document, the Service treated the "1002" area as a minimal management area in all of the alternatives. (See also response #1 to the National Audubon Society and response #1 to the Citizens' Advisory Commission on Federal Areas.) The Service does not believe it is appropriate to address other possible scenarios for the "1002" area for the reasons given in the "Notice to Reader" in the beginning of the plan--Congress is presently considering the future management of the "1002" area. The quote you cited on page 154 does not exist. With regards to incorporation by reference, Section 1502.21 of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act states that "agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action." The Service intended to incorporate the 1002(h) report by reference to make readers aware of that report and information on the coastal plain's resources and uses. It was not appropriate, however, to incorporate by reference the consequences and recommendations of the 1002(h) report into the refuge comprehensive conservation plan. The text in the final plan has been corrected to address this error. With regards to your statement that Congress may never take action on the Arctic Refuge, under Alternative D of the 1002(h) report, the "no action" alternative, the management of the "1002" area would be guided by the refuge comprehensive conservation plan--the area would remain under minimal management.
 2. See response #2 to the National Audubon Society. We disagree with your interpretation that if the land is suitable for wilderness it should be recommended.
 3. The draft plan did in fact address the proposed exchange agreement on pages 183-184. A separate legislative environmental impact statement is being prepared by the Service to describe in more detail the proposed exchange and address its potential impacts.
 4. The Service does not prepare land protection plans for refuges. There are very few private inholdings in the Arctic Refuge (see pages 55-57 of the draft plan). However, the Service will develop a land concept plan to determine needs for land protection in the refuge. This concept plan will set priorities for acquisition of inholdings from willing sellers.
 5. Comment noted. The Service is not proposing to build new facilities in the refuge under its preferred alternative--temporary structures and seasonal camps generally will be relied on, although the Service reserves the option in the future to build permanent facilities if necessary to better manage the refuge's fish and wildlife populations and users. As noted on page 211 of the draft plan, the Service will complete a facilities plan that addresses facilities needs of the refuge. The Service disagrees that the Peters Lake station and the administrative

cabins at Elusive Lake, Junjik River and Mancha Creek are unnecessary-- these facilities are used by the Service for research studies and law enforcement, and also can be used by the public for emergencies. (Two of the buildings at Peters Lake, however, are scheduled for removal, as noted in the draft plan.) With regards to subsistence use cabins that are not in use, if the Service determines after careful research that the cabins have in fact been abandoned, they will be disposed of in accordance with the Service's cabin policy and Title 41 of the Code of Federal Regulations. (See also response #4 to the State of Alaska and response #2 to the Citizens' Advisory Commission on Federal Areas.)

See response #7 to Trustees for Alaska regarding the construction of facilities to support offshore oil development.

The Department of Defense or its contractors will be cleaning up the abandoned Distant Early Warning Line sites along the coast.

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6. The Service agrees that the Arctic Refuge has fragile ecosystems, and that eventually actions such as you suggested may need to be implemented to protect refuge resources (see pages 200-201 of the draft plan). We also agree that additional data are needed on public use and its impacts on the refuge. Regardless of whether or not an area is designated wilderness, the Service has authority to regulate recreational use in the Arctic Refuge. However, the refuge currently receives relatively little use overall. Although recreational use is increasing in the Arctic Refuge, the Service is not aware of any areas that are experiencing overcrowding similar to the places you cited. Under Section 1110(a) of the Alaska Lands Act the Service can restrict access into the refuge only if it can demonstrate the use is detrimental to the resource values of the refuge. The Service has not yet identified such a situation in the Arctic Refuge. As noted on page 201 of the draft plan, the Service will address the need for restrictions of recreational use in a step-down recreation management plan. See also response #6 to the Citizens' Advisory Commission on Federal Areas.

Limits on commercial guided and outfitted use are discussed in the draft plan on pages 209-210. Under all of the alternatives the Service will monitor this use in the refuge and restrict this use if necessary. Although the Service recognizes there may be a need in the future to limit the number of guide and outfitter operations, the Service does not believe there is a need now to institute such restrictions in the Arctic Refuge. See also response #15 to the State of Alaska.

7. Comment noted. The Service disagrees that uses of helicopters should be prohibited except under the limited circumstances you noted. Much of the Arctic Refuge is only accessible by helicopter. Helicopters have traditionally been used on the Arctic Refuge for geologic studies and scientific studies. The Service's regional policy for Alaska refuges is that a person in pursuit of traditional activities on refuge lands, including wilderness, may use helicopters. All helicopter landings on refuges must be covered by a special use permit or a memorandum of understanding in order to protect refuge resources, including wilderness values.

Navigation maps presently recommend that aircraft stay above 2,000 feet while flying over Alaska refuges. However, the Service has no authority to establish minimum height requirements for the Arctic Refuge, nor does the Service have sufficient cause to propose a minimum height requirement to the Federal Aviation Administration - the agency that would need to take this action.

8. We disagree with your assertion. The Resource Development Council for Alaska requested that we consider an alternative that provides for this use in the plan. They have as much right to propose such an alternative as you do to propose an alternative with additional wilderness in the refuge.
9. The Service has not determined whether the Arctic Refuge is suitable for designation as either a Biosphere Reserve or a World Heritage Site. The International Biosphere Reservation and World Heritage Site programs require close scrutiny of sites prior to their nomination. For example, the Biosphere Reserve Program encourages voluntary cooperation to conserve and use resources for the well-being of people everywhere. It is not clear therefore whether the designation is appropriate for the Arctic Refuge. It also is not certain how all of the Arctic Refuge will be managed in the future. The Service will take your recommendation under advisement and evaluate the refuge's suitability after the refuge planning process has been completed.



**WILDLIFE
FEDERATION
OF ALASKA**
The Alaska Affiliate of the
National Wildlife Federation

Mr. William Knauer

HAND DELIVERED

April 29, 1988

Regional Director. Attempting: Mr. William Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, Ak. 99503

Dear Mr. Knauer:

The Wildlife Federation of Alaska (WFA), the Alaska affiliate of the National Wildlife Federation has received the draft Arctic National Wildlife Refuge Comprehensive Conservation Plan, Wilderness Review, Environmental Impact Statement and Wild River Plan (Plan) dated January 1988. We appreciate this opportunity to review the Plan and offer the following comments and recommendations.

The Plan does not address the alternatives of wilderness designation or oil and gas development in the coastal plain (1002 area) because these were addressed in the Department of Interior's Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment. Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement (EIS). However, we wish to point out that we do not concur with the Secretary's recommendation in the EIS to make the entire 1002 area available for oil and gas leasing. Furthermore, we believe the Service was remiss in not including in the EIS a more complete analysis of the impacts of oil and gas development in the 1002 area on management of the remainder of the Arctic National Wildlife Refuge (Refuge), and a discussion of the potential impacts of oil and gas development outside the Refuge on management of Refuge resources. Oil and gas exploration and development are in progress and may accelerate in offshore, nearshore and onshore areas adjacent to the refuge. Therefore, an accurate assessment of potential impacts must take into consideration the cumulative effects of development activity adjacent to the refuge as well as in the 1002 area. Otherwise, the full scope and potential magnitude of the impacts of these activities on refuge resources will remain unexamined. Our

detailed comments on the draft EIS were provided to the Service on February 6, 1987.

The Arctic National Wildlife Refuge includes a full range of boreal forest, arctic mountain, and North Slope tundra habitats. The Refuge also encompasses three designated Wild Rivers (the Ivishak, Sheenjak and Wind Rivers). Section 303(2)(B) of the Alaska National Interest Lands Conservation Act (ANILCA) declared the purpose for which the Arctic National Wildlife Refuge was established and shall be managed to include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including the participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

Standards to be achieved in development of comprehensive conservation plans for national wildlife refuges in Alaska (Section 304(g) of ANILCA) specify that the Secretary of Interior is required to identify and describe the populations and habitats of fish and wildlife resources, special values of the refuge, and significant problems which may adversely affect populations and habitats of fish and wildlife. Based on this information, the Secretary is also required to:

* designate areas within the Refuge according to their respective resource and values;

Mr. William Knauer

* specify the programs for conserving fish and wildlife and programs relating to maintaining the values previously identified for these areas; and

* specify the uses within each such area which may be compatible with the major purposes of the refuge (emphasis added).

According to the National Wildlife Refuge System Administration Act and Section 304(b) of ANILCA, no discretionary use of a national wildlife refuge can be permitted by the Service unless it is first determined to be compatible with the purposes for which the refuge was established.

In reviewing the seven alternative strategies considered for long-term management of the Refuge, it is clear that the fish and wildlife resources and habitats, arctic ecosystems, and special values (wilderness, ecological, geological/paleontological, and scenic/recreational) recognized in the planning document strongly indicate that a preferred management strategy should actively address the protection and maintenance of the important resource attributes for which the Refuge was created. However, the U.S. Fish and Wildlife Service preferred Alternative "A" (no action) is inadequate to ensure that recognized resource values will be maintained when faced with incompatible uses of the Refuge lands and water. Although the Service states that Alternative "A" would maintain the current range and intensity of management and recreational and economic uses, it is a passive management recommendation that only defers consideration of potentially incompatible resource use decisions.

The Wildlife Federation of Alaska support management alternative "E" (8.5 million acres of additional wilderness designation) for the Refuge, based upon:

* the major purposes for creation of the Refuge;

* the presence of important fish and wildlife populations and sensitive habitats;

Mr. William Knauer

* the limited potential for resource extraction activities compatible with the major purposes of the Arctic Refuge; and

* the occurrence of special values, including wilderness qualities, which are consistent with the U.S. Fish and Wildlife evaluation criteria.

Under alternative "E", management of the Refuge will be consistent with the mandates of its creation and will provide clear and defined guidance to the U.S.F.W.S. and the public concerning protection of the Arctic National Wildlife Refuge System.

Thank you for the opportunity to comment on the draft Plan for the Arctic National Wildlife Refuge. Please feel free to contact me should you have any questions concerning our comments.

Sincerely,

Jim Jackson by BQ
Jim Jackson
Acting President
Wildlife Federation of Ak

P.O. Box 10358
Fairbanks, AK 99710
April 23, 1988

Mr. Bill Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

Dear Mr. Knauer;

I am writing to comment on the draft Comprehensive Conservation Plan for the Arctic National Wildlife Refuge. I am very disappointed in the U.S. Fish and Wildlife Service for its proposed preferred alternative which will not adequately protect the unique and special values of the northeastern Brooks Range. The only acceptable alternatives are alternatives F and G which recommend the entire refuge south of the coastal plain for Wilderness designation. Many of the values of the refuge are derived from the protection of large portions of an ecosystem; the health of the wildlife that is a primary purpose for the establishment of the refuge depends on it. In a time when we are struggling to preserve just remnants of other large ecosystems such as the rain forests, it cannot be justified to pass up the opportunity to give additional protection in the form of Wilderness designation to one of the last remaining intact areas representing such a vast array of biological, cultural and social resources. Such an area deserves protection from outside influences, but more importantly, needs protection from the vagaries of management decisions and administrative changes. The cumulative effects of even slightly inappropriate management decisions, or of swings in Departmental priorities or thrusts, can be as detrimental to the wilderness and special values as can large scale development, but these changes are so slow that their effects are not noticed until it is often too late or extremely difficult to reverse management direction. The designation of Wilderness would dictate to management a different set of standards and national priorities that if the area is managed like any other national wildlife refuge.

The plan needs to address the reasons for which not a single acre of additional wilderness was proposed in the plan after the Wilderness Review found the area eligible. Documentation should be provided. Without this documentation, the public can only conclude that the planning process has been a political one, and not an informed evaluation and wilderness review. It is impossible to believe that not one additional acre out of the over 9 million reviewed warrants designation.

On pages 183-184 of the draft plan, the acquisition of land within the refuge is discussed. The only method of acquisition mentioned is land exchanges. This language needs to be altered to include the other available means of acquiring land within federal conservation areas, including purchase from willing sellers, purchase of interests in the private lands (i.e. development rights or mineral rights), or donations.

Thank you for the opportunity to comment on this plan. I sincerely hope that the Fish and Wildlife Service will look upon the Arctic Refuge as a global resource, and look long into the future when deciding the final plan proposal.

Sincerely,

Judy Alderson
Judy Alderson

Responses to Judy Alderson

1. See response #2 to the National Audubon Society. As was pointed out on page 203 in the draft plan, not all lands identified as being suitable for wilderness are proposed for wilderness designation. We would further point out that wilderness designation was not the only factor in the Service's selection of a preferred alternative.
2. Comment noted. We have added a statement to the final plan that states that under Section 1302 of the Alaska Lands Act the Secretary of Interior is given the authority to acquire by purchase, donation, exchange, or otherwise any lands within the boundaries of national wildlife refuges.

ARCO Alaska, Inc.
Post Office Box 100360
Anchorage, Alaska 99510-0360
Telephone 907 265 6123

James M. Posey
Manager
Issue Advocacy



April, 21, 1988

Mr. William Knauer,
U. S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Knauer,

ARCO Alaska, Inc. has reviewed the draft Comprehensive Conservation Plan (CCP), Wilderness Review (WR), and Wild River Plan and offer the following brief commentary for your consideration.

We believe the plan provided a comprehensive analysis of the management alternatives (A through G). We applaud the Service for their prudent selection of Alternative A as the preferred alternative, and as such, we totally support this action. We would have preferred, of course, a more resource-oriented alternative such as B or C, but Alternative A does grant the Service the flexibility necessary for future mineral resource evaluation on a case by case basis.

Your selection of a non-wilderness alternative recognizes the need for continued mineral resource evaluation that would otherwise be impossible if a wilderness designation were applied to this area. Alternative A does have the balance needed for future resource evaluation while providing the necessary safeguards for the protection of this area.

Yours Truly,

for J. M. Posey *R. O. Ogm*

9244 Strathmore Drive
Anchorage, Alaska 99515
March 6, 1988

Mr. William W. Knauer
United States Fish & Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Re: Arctic National Wildlife Refuge

Dear Mr. Knauer:

The draft comprehensive plan for the Arctic NWR is seriously deficient and should not be adopted in its present form.

Initially, despite its name it is not "comprehensive." It does not evaluate the "1002" area on the coastal plain. According to page 46 of last year's 1002 Report, "The 1002 area is the most biologically productive part of the Arctic Refuge for wildlife and is the center of wildlife activity." A plan for ANWR which omits the 1002 area is necessarily inadequate.

The 1002 Report is no substitute for including the 1002 area in the ANWR comprehensive plan. The 1002 Report is not a comprehensive management plan for the coastal plain or a wilderness review. Even if it were, the township lines which divide the 1002 area from the rest of ANWR are of no significance to the wildlife. "Comprehensive" planning, by definition, must not stop at such arbitrary lines.

The other great deficiency in the draft plan is the failure to recommend any new wilderness areas. The draft recognizes that ANWR's wilderness values are the reason it was set aside in the first place. [Pages 31, 46-49] It correctly concludes that virtually all of ANWR is suitable for wilderness designation. [Pages 162-65]

There are few, if any, places in the country more suitable for wilderness designation than ANWR. It is, to use the description of your alternative G, "the last great wilderness." So what are you waiting for? ANWR can only become less suitable for wilderness status if it is not designated at this time.

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2

300 years ago they said the wilderness of Massachusetts would last forever. 200 years ago they said that about Kentucky. 100 years ago, Wyoming. They were wrong every time. This history teaches us that, unless ANWR is designated as wilderness by Congress, in the 21st century it will become like Massachusetts and Kentucky and Wyoming. They are fine places, but the point is that ANWR is different. They are now man's places, not nature's. And if ANWR goes the way of the rest of the country, there are no more new wildernesses over the horizon this time. This is the end of the line. We don't get another chance to change our minds.

The so-called "no more" clause of section 101(d) of ANILCA is an inadequate reason not to recommend any new wilderness designations. [Pages 207-04] If that clause were intended to dictate the results of your wilderness review, Congress wouldn't have instructed you to spin your wheels and waste money that we don't have on a futile wilderness review. ANILCA directed a wilderness review at all because the 96th Congress realized it could not bind its successors with the "no more" clause. The 96th Congress realized that once the passions of ANILCA had cooled, future Congresses might realize how shortsighted and inappropriate the "no more" clause of ANILCA had been. You have short-circuited that process by using the "no more" clause as an excuse not to recommend wilderness designation of America's "last great wilderness."

Finally, as the planning process goes forward please keep in mind that ANWR, being a national symbol and a national treasure, has a national constituency. Don't discount the opinions of those of its friends who live much further away from ANWR than you and I do. 4000 miles away from Valley Forge and the Statue of Liberty, I want the Park Service to take good care of them for me. I would be appalled if the -- my -- Park Service sold them off to help reduce the federal deficit.

The Pennsylvanian or New Hampshire fireman who writes you to urge that all of ANWR be designated as wilderness does so for the same reason, and is entitled to just as much consideration. His nation -- our nation -- loses a part of what made it great if wells are drilled or timber is cut in ANWR. More importantly, our nation loses a part of what made it good.

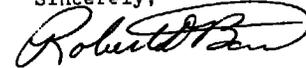
The final plan for ANWR should:

- . include the 1002 area;
- . recommend that Congress designate the entire refuge as wilderness, and

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. prohibit permanent structures and commercial development including oil and gas and timber operations, .

Sincerely,



Robert D. Bacon

Responses to Robert Bacon

1. The Service did not omit the "1002" area from the plan. See response #1 to the Citizens' Advisory Commission on Federal Areas, response #1 to the National Audubon Society, and response #1 to the Wilderness Society.
2. See response #2 to the National Audubon Society.

RESPONSE FORM

Alternative A

Too, but doesn't go far enough to protect an area unique to the world. ~~It~~ doesn't fully address the consequences found in the Brooks Range or the Porcupine Plateau units.

Alternative D

not enough. The report states that the Brooks Range and the Porcupine Plateau Unit meet Wilderness requirements. P 33-36 of the Plan describes these areas, and I can hardly think of areas in the United States that be more deserving of wilderness protection.

Alternative B

Too destructive. The direct evaluation of this plan is correct. Oil & gas leasing can cause population influx into an area, air pollution and water quality problems. Roads & housing would be necessary. At the very least, air strips, storage ponds for drilling muds, land and increase of non-productive human activities. Very costly. (See p. 73 of comprehensive conservation plan) while providing very little real long-term benefits, especially to locals. Doesn't follow common management directions found on pages 44-45 of the plan. ¹

Alternative C

almost as bad as B. Timber harvesting in northern Alaska is destructive slow growth sites for tree bore borer vegetation. Loss of winter protection and feeding areas for moose and furbers doesn't help subsistence here, nor does it enhance the natural wonders found here. Could also cause degradation of water from runoff. Doesn't follow common management directions found on pages 44-45 of the plan. ²

Alternative E

not enough

Alternative F

not enough, but at least it does include the Brooks and the Porcupine Plateau units under wilderness protection. P. 35 tells what can be found here. It needs our protection. It deserves our protection.

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Alternative C

addresses over use of recreational ^{use} left allows for "reasonable access" (protects but doesn't deny). If unlimited use by people continues, degradation will follow. Alaska is becoming increasingly popular, and unless steps are taken now, resources will ruin. In bear management, buildings would be prohibited, aircraft restricted (possibly helping decreasing illegal hunting of wolf & bear). The least cost of the plan, as the chart on p 72 shows, to implement.

Additional Comments

Alternative C (above) has the most ideas that will benefit the Arctic wildlife refuge. There are so few areas in the United States left that present such an array of beauty and life left in its most natural state. The rarity that could vanish with a stroke of the Service pen. Page 10 calls it a "crown jewel" jewels are prized, guarded, watched over and admired. The wildlife here, from muskox to wolf, is varied and abundant. Waterfowl and raptors, fish and scenery - all thriving and varied. G also best implements the common management directions found on pages 44-45. Ensuring natural diversity, water quality, access in the traditional sense, reasonable access etc. G meets these directions.

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MS. DIANNA M. BROWN
P.O. BOX 250
GALESVILLE, WI. 54630



Responses to Dianna Brown

1. Comment noted. We believe that all of the common management directions noted could be implemented under Alternative B, with the exception of the prohibition on oil and gas production in the refuge. As the text notes on page 49, the Service could only provide opportunities for oil and gas leasing under this alternative if Congress repeals Section 1003 of the Alaska Lands Act.
2. It is the intent of the Service to ensure that water quality is protected refuge-wide under all of the alternatives, as mandated by the Alaska Lands Act. It is true that water quality could be impaired in a localized area if timber harvesting occurred under Alternative C. However, the Service believes this potential localized impact would not be inconsistent with the intent stated in the common management directions. Section 303(2)(B) requires the Service to ensure to the maximum extent practicable water quality.

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RESPONSE FORM

Alternative A

OBJECT

Alternative D

OBJECT

Alternative B

OBJECT

Alternative E

OBJECT

Alternative C

OBJECT

Alternative F

OBJECT

Alternative G

I can live with this one but recommend a few minor changes to:

Item 4 Page 71. See no objection to use of boat motors up to 5 h.p. or 10 h.p. on lakes. All terrain vehicles (3 or 4 wheels and snow machines) use only on frozen rivers.

1

Item 5. No trapping to be allowed. No commercial exploitation such as guiding or outfitting to be permitted.

2

Item 6. No oil and gas studies to be permitted. Why explore if no development is to be permitted.

3

Item 7. No mining to take place on refuge land.

4

staple here

Additional Comments

This is the last piece of relatively unspoiled wilderness left on the North American continent. I cannot understand why everyone is so eager to destroy it. It should be preserved in its natural state forever. I would recommend that the area be expanded to the west to join with the Gates of the Arctic.

My reason for no commercial operation is -- A couple of years ago I spent a week on the Hulahula River on the lake at the big bend. A commercial guide operates off a strip about ten miles down stream from the lake. His two super cubs were flying constantly back and forth thru the hills and up and down the valley. I presume looking for sheep. I object to this type of operation. I don't mind landing a cub on the sand bar provided no effort is made to improve a strip to support some bigger and better operation. Hunting should be closely controlled. People visiting like to see animals and they won't if some guy in a cub has chased them into the highest levels.

I don't want to see this area exploited by anyone but I don't want the rangers all over the place either. Basic rules eliminating all commercial exploitation properly made should eliminate all these problems.

fold here

THOMAS J. CLASSEN
P. O. Box 80507
Fairbanks, Alaska 99708



Responses to Thomas Classen

1. Comment noted. This alternative was developed by the Northern Alaska Environmental Center and other conservation groups. To meet the concerns of these groups, the Service does not believe it is appropriate to modify the alternative unless the groups agree to the change. They would not allow these motorized vehicles under Alternative G.
2. See response #1. We also would point out that trapping, guiding and outfitting are traditional uses of the Arctic Refuge, and have occurred there before the refuge was established by Congress. These uses are permitted on all national wildlife refuges in Alaska.
3. Comment noted. See response #1. Oil and gas studies are another traditional use of the Arctic Refuge. Under Section 1010 of the Alaska Lands Act the Secretary of Interior is required to assess the oil, gas and other mineral potential of all public lands in Alaska, including the Arctic Refuge. Congress authorized these studies to expand the data base of the federal government.
4. Comment noted. See response #1. Although Public Land Order 2214 closed the Arctic Refuge to appropriation under the mining laws (hardrock minerals) and Section 304(c) of the Alaska Lands Act withdrew lands in the new additions to the refuge from location, entry and patent under the mining laws, this withdrawal is subject to valid existing rights. The claims in the Arctic Refuge, all of which are in the new additions to the refuge, existed prior to the enactment of the Alaska Lands Act. The Service therefore cannot prohibit mining on these claims in Alternative G.

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RESPONSE FORM

Alternative A

a political cop-out; does not permanently protect arctic ecosystem from oil and gas interests and other mining interests; too easy to be changed by "economic development" administration so as to allow moderate + intensive management

Alternative B

unacceptable since moderate and intensive management allowed; does not insure protection of arctic ecosystem in unaltered state; too costly.

Alternative C

unacceptable since moderate management allowed; does not insure protection of arctic ecosystem in unaltered state; too costly.

Alternative D

acceptable - attempts to permanently protect scenic mountains in southwest corner of refuge; compatible with purpose of refuge establishment - protects arctic ecosystem and physical landscape.

Alternative E

more acceptable; protects permanently the southwest corner and the southeast corner where endangered peregrine falcon nests and thousands of birds breed; compatible with purpose of refuge establishment - protects arctic ecosystem; cost effective.

Alternative F

most acceptable; ^{most} compatible with purpose of refuge establishment - protects arctic ecosystem; ^{most} cost effective especially over Alternat A.

MY preferred alternative

Alternative C

unlikely to pass Congress; theoretically acceptable, however politically unacceptable; thus alternative appears too radical for current Congress. Alternative F is less radical and protects in my opinion, just as well.

Response to Vicki Finn

1. The table on page 8 in fact did refer to a different set of alternatives than those described later in the draft. The table refers to a preliminary set of alternatives developed early in the planning process. We have footnoted the table in the final plan, which should eliminate the confusion you experienced.

Additional Comments

Wilderness designation already protects several of the special value areas listed on pg. 17 of the Draft. However, I feel that numbers 9, 12, 13, 15, 18, 17 and 19 should also receive protection - permanent protection. I have studied this refuge very extensively as part of my master's degree and feel that the area is very unique and deserves special, permanent attention. The FWS is doing an excellent job, but I feel wilderness designation as proposed under alternative F will preserve in perpetuity the good job the FWS started. Specifically areas containing #12 + #18 deserve protection for their watershed importance.

I'd like to point out that your Table on pg. 8 confuses the reader especially when one compares it to the Alternatives listed and described later on in the Draft.

Vicki Finn
RR 5, Box 469
Nashville, Indiana
47448

①

Alternative C

I SUPPORT ALTERNATIVE 'G' FOR MANY REASONS. AS A BIOGEOGRAPHER AND A TEACHER I HAVE FOLLOWED THIS ISSUE FOR QUITE SOME TIME NOW. MY SPECIAL TRAINING TOOK PLACE IN BOTH ARCTIC AND SUB-ARCTIC REGIONS OF ALASKA, YUKON AND THE NORTHWEST TERRITORIES. ALTHOUGH I HAVE NOT YET HAD THE OPPORTUNITY TO VISIT ANWR, I HAVE, IN FACT, BEEN ON THE ARCTIC COASTAL PLAIN. IN ANY EVENT, I AM FAMILIAR

Additional Comments

WITH THE ISSUE, AND THE MANY PARAMETERS OF THIS COMPLEX ECOSYSTEM WHICH ARE AT STAKE. AFTER THOROUGHLY READING THE PREFERRED ALTERNATIVE, 'A', AND THE U.S.F.W. SERVICES REASONS FOR SUPPORTING THIS ALTERNATIVE, I QUESTION THE RATIONALITY OF THOSE WHO PROMULGATED THIS DECISION. WHILE YOU TAKE PAINS TO MAKE IT CLEAR THAT THE OPPORTUNITY TO CONTINUE SUBSISTENCE PRACTICES ON THE REFUGE, IN NO WAY CAN YOU CLAIM THAT THE DEVELOPMENT ASSOCIATED WITH ALTERNATIVE 'A' WILL NOT ADVERSELY AFFECT THE EXISTING CARIBOU HERD. IF THAT POPULATION IS REDUCED AT ALL, FOR REASONS DUE DIRECTLY OR INDIRECTLY TO EXPLORATION OR EXPLOITATION OF OIL OR MINERALS, YOUR ASSURANCES OF MAINTAINING SUBSISTENCE OPPORTUNITIES ARE DIMINISHED

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THE CENTER FOR NORTHERN STUDIES

WOLCOTT, VERMONT USA 05680 (802) 888-4331

POSSIBLY QUITE SUBSTANTIALLY. I TAKE ISSUE WITH THE CLAIMS THAT ALTERNATIVE 'A' "MAINTAINS" BOTH THE CARIBOU POPULATION AND WILDERNESS VALUES OVERALL. THIS CLAIM APPEARS EXAGGERATED AND UNSUBSTANTIATED. I COULD GO ON AND ON ABOUT THIS, BUT LET IT SUFFICE TO SAY THAT ALTERNATIVE 'G' IS THE MOST SOUND ALTERNATIVE BIOLOGICALLY, AESTHETICALLY AND ECONOMICALLY. WHILE NO PRICE CAN BE PUT ON THE WILDERNESS VALUE OF THIS LARGELY PRISTINE ECOSYSTEM, IT IS SAFE TO SAY THAT IS NOT WORTH THE BENEFIT OF THE EXTRACTED OIL, IF ANY IS INDEED FOUND, TO LOSE THIS AREA OR REDUCE ITS CARRYING CAPACITY IN ANY WAY.

SINCERELY,

Bruce C. Forbes

BRUCE C. FORBES
THE CENTER FOR NORTHERN STUDIES
WOLCOTT, VERMONT 05680

P.S. THE FAVOR OF A REPLY IS REQUESTED, IF AND WHEN THAT BECOMES POSSIBLE.

PAUL E. TURNER, Ph.D.
CLINICAL PSYCHOLOGIST
BOX 270
KENAI, ALASKA 99611
(907) 283-7015

February 21, 1988

William Knauer
Arctic Refuge
U. S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Response to Bruce C. Forbes

1. Comment noted. There are no new developments the Service would propose or permit under Alternative A--this alternative would maintain the current situation in the refuge. Oil and gas studies could occur, but would be expected to have a negligible impact on the refuge. Oil and gas development would continue to be prohibited, as required under Section 1003 of the Alaska Lands Act. The Service cannot prohibit mining of valid claims in the refuge under any of the alternatives (see also response #4 to Thomas Classen). The Service does not believe the alternative would adversely affect the existing Porcupine caribou herd, subsistence opportunities or wilderness values (for an explanation, see pages 273-274, 277-278, and 279-283 of the full draft plan).

Dear Mr. Knauer:

I have received and reviewed the Arctic National Wildlife Refuge Comprehensive Conservation Plan. I have several comments to make regarding this draft summary, though first I wish to say thank you for the work that you have done in focussing on the Arctic Refuge.

I have backpacked in the Refuge for a total of about 25 days over two summers. I feel that I have some perspectives that I would have not otherwise had without this experience. Next, I have backpacked in New Mexico and Montana. In addition, I have walked in many parts of the Kenai Peninsula as well as the Lake Clark Pass area for the nine or more years I have lived in Kenai. This outdoor experience offers a perspective that cannot otherwise be appreciated.

The truly wilderness aspect of this area cannot be adequately portrayed or articulated. Never have I experienced an area with as much space in its truly natural state as the Arctic Refuge. I have images deeply engraved in my mind of thousands of acres of the Refuge literally untouched by human hand. I have never hiked in an area that displays such little evidence of the passing of those few before me.

I have strong objections to all five alternatives in your draft plan. I would have been in strong favor of an alternative that specified wilderness designation in all of the Refuge. The absence of this alternative is such a travesty that I emphatically insist that a new and revised draft summary be completed in order to identify the indisputable alternative of wilderness designation for the entire Refuge.

In every alternative identified in your plan, the coastal plain was reserved for minimal management. I object strongly to this. In reviewing your plan, I am most in favor of alternative E, though I would ask that the coastal plain be included in the wilderness designation of the entire Refuge.

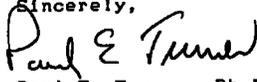
I feel that your alternatives are a bit deceptive in that on page 33 the referent for "1002(h) area" is not available to none but the careful reader, particularly that no plan has an index. Page 11 describes this as the coastal plain aspect of the Refuge. I would

never have discovered this without careful examining the maps for each alternative quite frankly. Your decision to exclude this is a disastrous impediment to your plan. I strongly urge your inclusion of this special area for inclusion in your draft summary.

I am in opposition of any management options that disturb this truly pristine environment. As a consequence, I would respectfully request that permanent structures including those related to oil and gas development be excluded from the Refuge. Next, I would object to development oriented operations of any kind, including but not limited to oil, gas and timber.

Last, I would hope that the Service would complete studies to preserve the true wilderness aspect of this environment. The fragile and tentative environment cannot tolerate intense use to say the least. Careful studies of human impact would enable allow this wilderness sanctuary to be experienced by the future generations of our land.

Thank you for the opportunity to make my comments to you.

Sincerely,

Paul E. Turner, Ph.D.

Copy To: Representative Young
Senator Murkowski
Senator Stevens

Response to Dr. Paul E. Turner

1. Comment noted. The Service's treatment of the "1002" area in the refuge comprehensive conservation plan is described at the very beginning of the summary, before the title page, in a "Notice to Reader." We feel this discussion was clear and readily available to all readers of the document.

April 15, 1988

Greg Warren
2605 Raymond Ave.
Missoula, MT 59802

U.S. Fish and Wildlife Service
Regional Director Office
Attention: Bill Knauer
1011 E. Tudor Road
Anchorage, AK 99503

RE: Comments on Draft Arctic National Wildlife Refuge
Comprehensive Conservation Plan, EIS, Wilderness Review,
and Wild River Plan

Draft document
page number

Page 5: ANILCA identifies the purpose of the refuge to include those items identified in the draft document; however, the Act also designated such of the refuge as wilderness. I believe that the purpose of wilderness as described in Sec. 2.(a) of PL 88-577 should also be highlighted in this this section of the draft. This would better introduce the rest of the Plan. 1

Page 10, 11: It appears that this Plan is primarily only programmatic, while ANILCA is directing the USFWS to produce a Plan that is specific (Sec. 304(g)). I believe that this document needs to be specific enough to make decisions regarding such items as visitor-use management including access limitations and game harvest disturbance thresholds. Decisions involving the interrelationships of various resources need to be addressed in one NEPA document. Many of my further comments relate to the need for a more detailed Comprehensive Plan based on adequate data and disclosure of consequences. 2

Page 19-22: Many of the concerns identified, such as "...low flying airplanes often harassed wildlife..." are not resolved in this planning document as required by Sec 304(g) and NEPA. Other significant issues such as limiting impacts caused by too much localized visitor and aircraft use should be resolved in this Plan. 3

Page 23: The legal responsibility of the State of Alaska should be clearly identified in the Plan. I have found no reference in ANILCA giving the state the authority to manage the wildlife in the refuge. This authority and responsibility rests with the USDI Fish and Wildlife Service. Cooperation is great, but agreements must be made that are consistent with law, regulation, and approved management plans; and only after NEPA compliance that tiers to this final EIS. 4

Page 28-31: USFWS concerns provide the most detail as to the possible on going effects of visitor use. I believe that this level of detail is appropriate and should be the minimum standard for providing the information in the affected environment and building the environmental consequences sections of the EIS. 5

These other sections of the EIS should address, in detail, such concerns as the effects of human disturbance on the ecosystems including predator-prey relationships, natural diversity, and local plant and animal populations including wolf populations, wilderness values, and archeological sites. Conflicts caused by such issues as excessive aircraft use needs to be resolved in this Plan. These decisions all need to be met in this Plan to meet the requirements of NEPA and ANILCA.

Page 33: The legislative history of ANILCA emphasizes the maintenance of ecosystems (Senate Report 96-413, pg. 174 & 175; House Report Vol 3 pg. 177 & 181) and page 46 of this document. I believe that the effects of management actions on the ANWR ecosystems needs to be a significant issue and addressed in the EIS.

Page 33: The Plan should have defined "management emergency". I cannot imagine a habitat improvement that would meet the intent of ANILCA. Without disclosure in a DEIS, the Record of Decision cannot approve this exception.

Page 34: The Plan should describe management direction, and the EIS discloses impacts that will occur if alternatives are adopted. As it reads now, it implies that impacts of proposed management direction on wilderness qualities are not known. Where information is lacking, you need to follow 40 CFR 1502.22.

Page 35: In the discussion of aircraft access, you should describe that traditional means of access is allowed; however, use levels are to be managed. Senate Report 96-413 pg. 299 helps define Sec. 1110(a) of the ANILCA.

Page 76: The affected environment section should also include descriptions of natural diversity and ecosystems. The natural dynamics of the wolf-Dall sheep relationships and existing effects of visitor-use on wolves and Dall sheep need to be discussed; current effects of visitor-use on populations should be addressed in terms of total numbers of animals, age structures of sub-populations, distributions of populations, structure and function of ecosystems, and natural diversity. Discussions need to include references to scientific sources, and natural diversity should be defined using accepted scientific terminology. I believe that all of the items highlighted on page 161 should also be discussed for the existing wilderness in the ANWR.

Page 102, 112, 114, and 116: Where data is lacking or unreliable, worst-case scenarios should be described. I believe that this applies to moose, Dall sheep, wolves, and grizzly bears.

Page 138: Levels of use associated with access and transportation should be described in quantified terms.

Page 150: Where data is lacking or unreliable, worst-case scenarios should be described. This applies to visitor-use levels, including sport hunting. Please note that I sent information to ANWR in 1978 that relates to visitor-use in the additions to the refuge. Analysis of questionnaires of over 50 individuals that only visited an addition area showed no significant differences between their socio-economic characteristics and attitudes, and those characteristics and attitudes of individuals that visited the existing ANWR.

Page 166: Objectives and standards should be defined for each management alternative. Objectives and standards need to be measurable and time specific to provide for a clear understanding of the intent of the alternative, adequate disclosure, and for meaningful monitoring. See the Gates of the Arctic management plan for an example of how to use objectives and standards.

Page 167: Table 9 needs to include a statement for all "may be permitted" and "normally not be permitted" activities that says: "subject to the provisions of the NEPA. This includes statements on wildlife stocking, administrative facilities, Fish Passes, Fish Weirs, Spawning Channels, Physical Habitat Modifications, and Chemical Habitat Modifications.

Page 169: Habitat Improvements, Timber Management, Wildlife Species Introduction, Habitat Modification, Chemical Habitat Modification, Reintroductions that don't meet the purpose of natural diversity, Fish Hatcheries, Supplemental Fish Productions, Predator Control (as defined), Developed boat launch ramps, Sand and Gravel Removal, are not compatible with wilderness and in most cases are not compatible with wild river management. To meet the intent of ANILCA and Wilderness Act this Plan should have made more basic decisions. The numerous deferred decisions, implies tentative approval of compatibility, and many proposed management practices are clearly incompatible.

Page 182: Compatibility discussion should also highlight the need to meet NEPA requirements.

Page 186: Research should focus on the interrelationships of visitor-use, vegetation, and wildlife. The key to successful visitor-use management is to go past descriptive studies to understanding how visitor-use affects the structure and function of the ecosystem and natural diversity. These types of studies should be added as research needs and budgeted for.

Page 188: The definition of natural diversity is key to the management of the Refuge; therefore, I believe it is essential that you define natural diversity using state-of-the-art scientific concepts, and in terms of ANILCA direction to manage the ecosystem. The statement that natural diversity is also not intended to preclude predator control is not supported by ANILCA and the Congressional Record notes cited do not exist/relate to predator control.

Page 189: The Refuge needs to include wolves as an indicator of the health and stability of the ecosystem.

Page 190: The Service should also place special emphasis on Lake Trout. This is especially important in Lake Peters and Schrader where early season fishing has already changed the population characteristics of the fish.

Page 194: ANWR wilderness should be recommended for as Class 1 air quality area. This would be well fitting for this wilderness.

Page 196: Alternatives need to be described in enough detail so that effects can be disclosed and mitigated. This is especially important in cases where proposed actions are connected and thus need to be addressed in one NEPA document. In the case of public access and transportation management, I

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believe that all alternatives need to be described in at least the detail as alternative G. In addition, all alternatives need to describe the experience objectives for recreational use. The Recreation Opportunity Spectrum (ROS) concepts would be the state-of-the-art approach for describing recreation objectives. However, and even more important, effects of alternatives need to be displayed using Limits of Acceptable Change (LAC) concepts relating to effects on experiences being sought and that are mandated to be provided by law. RVD level use figures have no useful correlation with effects. Levels of aircraft use in some areas is currently decreasing the quality of recreational experiences, and all alternatives need to address managing, mitigating, and disclosing these effects.

Page 197: Because of the connected actions of allowing uncontrolled aircraft use and the public interest in this issue, this is the document to make the decision to set aircraft use limits that become effective when aircraft impacts exceed disclosed maximum impact levels. Requirements of Section 110(a) of ANILCA needs to be met in this Plan and EIS. As a minimum, aircraft use levels should not exceed those permitted in 1980 until the effects of increase use is disclosed as required by NEPA.

Page 200: "Overcrowded" needs to be defined using LAC terminology. Hunting effects need to be limited to 1980 levels until such time that hunting effects on natural diversity and the ANWR ecosystem are analyzed following NEPA procedures. This document does not meet NEPA requirements to approve increased hunting effects on populations; this is especially true for sub-populations of wolves, moose, and Dall sheep. If information is lacking, a worst-case analysis should be performed.

Page 210: Mining claims should be aggressively scheduled for validity exams. The ANWR is so vast, that additional claim development could occur without your knowledge if left unmanaged, and this could lead to miners inadvertently and illegally later passing a validity/discovery test.

Page 213: All alternatives should establish LAC use levels for wilderness and minimal management areas to those levels that visitors recommended in 1977 (see my 1980 thesis). This appears to be the best information available to date. This could read, for example, that these areas would be managed so that their would be a 90 percent probability that a visitor would see no more than 3 light aircraft per week. Group size should be limited to a maximum of 12. Higher management intensities should have corresponding higher levels of use impacts allowed that correspond to ROS principles. Alternatives should also address "hunting quality". For example, most hunters would prefer a full-curl Dall sheep hunting regulation; this regulation could also indirectly benefit the structure and function of the ecosystem and natural diversity.

Page 261: A general comment is that where information is incomplete of unavailable the agency should have performed a worst-case analysis. All alternatives should disclose the effects on wolves: a significant predator in the ecosystem and a species that is being effected by human activities.

Page 263: The impacts on fish and wildlife should be described so that the scientific and analytic basis for comparisons of alternatives can be made. Discussions should address direct and indirect effects and means to mitigate the effects. The four categories of impacts do not meet these requirements.

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Also on this page, an assumption should be the development of the north slope, since that's what's being recommended, and a worst-case scenario is probably proper for describing the development effects.

Page 265 and 278: The increase in use levels discussion would be more appropriate in the affected environment and alternative sections. What are the effects of this increase use on visitor displacement (e.g., crowding, hunters displacing hikers), experiences, wildlife populations, and vegetation?

Page 269: Where is the analysis and what's the worst-case effects of making the decision not to limit aircraft access? Aircraft use cannot be allowed to increase without meeting NEPA requirements.

Page 276: The ecosystem disclosure needs to be backed by adequate data and analysis. This conclusion is not supported with either.

Page 279: Effects on Wilderness Values does not describe effects on experience but only describes a perceived difficulty assessing the effects. Sufficient data is available to assess the effects, and if data isn't available, NEPA permits the agency to engage in a worst-case analysis.

Described effects on naturalness of the preferred alternative should not be allowed based on ANILCA alone. These effects do significantly alter the ecosystem and natural diversity from what existed in 1980. In extrapolating this disclosure to the ANWR Wilderness, I am concerned that these effects are happening in existing wilderness. These effects discussions should have been included in this DEIS for the established ANWR wilderness.

Page 282: It is illegal to decide to allow increased hunting of Dall sheep without knowing (disclosing) the effects on local populations. In addition, ANILCA and the Wilderness Act does not allow for areas to be degraded or sacrificed. Hunting impacts must be held at no more than 1980 levels until NEPA requirements are met.

The process requirements described above for environmental consequences also apply to all the other alternative discussions.

Page 381: Mitigation needs to be addressed in the NEPA document.

Note that the USFWS has the authority and responsibility to manage fish and wildlife on the Refuge, and the State can only regulate wildlife to meet objectives established by the USFWS after following ANICLA and NEPA requirements.

Page 384: The Wilderness Act and Wild and Scenic Rivers Act should be a criteria to at least evaluate alternative effects on existing wilderness and wild and scenic rivers.

Page 399: ANILCA does not establish a purpose of the ANWR to provide for management flexibility or the option of changing management of the non-wilderness portion of the refuge to provide for compatible economic uses. In addition, NEPA requires public participation in decision making; thus, decisions should be made in this document on the management objectives and

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standards. The manager has the flexibility to revise the Plan and supplement the EIS.

I believe the selection of the preferred alternative should respond to public issues; however, only to the extent that the purposes of the Refuge are entirely met, and I don't believe that Alternative A, as now described, meets the purposes of the Refuge.

Page 450: The master memorandum of understanding between the state and the USFWS should be modified to say that there will be cooperation in meeting compatibility determinations and NEPA requirements in making fish and wildlife management decisions.

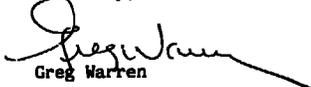
I prefer alternative G (pg. 250) of the alternatives presented. I believe that this best meets the purpose of the ANWR as described in ANILCA and the Wilderness Act. The additional wilderness designation in alternative G would insure that the purposes described in ANILCA for the refuge are met (another needed layer of protection). However, I believe that this document does not adequately meet process requirements to lead to a Final EIS, and a new draft should be issued after the process problems are corrected. A decision using the information in this document would not meet ANILCA, NEPA and the Administrative Procedures Act requirements. In the interim, visitor-use (oil related, miners, hunters, and general recreationists) effects on Refuge values should be limited to no more than the level of effects present in 1980.

In closing, I urge you to more fully explore the interrelationships of resources and connected actions in this document. Please also closely follow the process requirements in 40 CFR 1500. I believe that the requirements will help you (or I should say the Secretary) make the best and a reasoned decision.

I want to apologize for comments that are terse, that don't display tact, and the rough writing. I had very limited time to review and comment on the document.

Please place me on your mailing list to receive future drafts and the complete EIS, Plans, and ROD of this document when they become available. Please also place me on your public involvement mailing lists for all of the ANWR Compatibility Determinations including proposals to directly or indirectly allow for increased levels of public use (as required by NEPA).

Sincerely,


Greg Warren

cc: ANWR

1. Comment noted. It is true that the Alaska Lands Act designated much of the refuge as wilderness. However, the section referred to only describes the major purposes of the refuge. Wilderness is a purpose of the original Arctic Range, as specified in Public Land Order 2214, but it is not stated by the Alaska Lands Act to be a purpose of the entire refuge.
2. We disagree that this plan is not specific to the refuge and that it does not provide sufficient information to make decisions. We believe the refuge comprehensive conservation plan does address the interrelationships of various resources and their management. The refuge comprehensive conservation plans, however, are only intended to provide broad management guidance--it is not possible in these plans to resolve all of the questions facing management of the Arctic Refuge. Specific public use management questions will be addressed in subsequent step-down management plans. See also response #1 to Trustees for Alaska.
3. Comment noted. Neither Section 304(g) of the Alaska Lands Act nor the National Environmental Policy Act require the Service to resolve all of the concerns identified by the public in the refuge comprehensive conservation plans. The Service did examine all of the issues that were raised during the planning process and then identified which issues were significant for the plan (see pages 31-45 of the draft plan). All significant issues were addressed by the Service in the plan. Harassment of wildlife was not identified to be a significant issue by the Service. Visitor and aircraft use were identified to be significant issues, and were addressed in the "common management directions" and in the management alternatives.
4. Comment noted. Under the Alaska Statehood Act and the Alaska State Constitution the State of Alaska has responsibility for managing fish and wildlife in the state. Title 43 of the Code of Federal Regulations, Part 24.3 states: "Units of the National Wildlife Refuge System...shall be managed, to the extent practicable and compatible with the purposes for which they were established, in accordance with State laws and regulations, comprehensive plans for fish and wildlife developed by the States...." The Alaska Lands Act does not give the state authority to manage fish and wildlife in the Arctic Refuge. As you noted, the Service has the ultimate responsibility for management of the refuge and the conservation of fish and wildlife resources on those lands. The Service also recognizes that it shares a mutual concern for management of fish and wildlife in Alaska refuges with the state. The Service therefore entered into a cooperative memorandum of understanding with the state for management of fish and wildlife on all Alaska refuges, including the Arctic Refuge (see page 185 and 448-450 in the draft plan). We agree with you that all actions taken under this agreement must be consistent with law, regulation, and this refuge comprehensive conservation plan. No actions would be permitted that are contrary to the management directions in the refuge comprehensive conservation plan without first going through the National Environmental Policy Act process.
5. Comment noted. We believe the draft document addresses all the concerns you noted. See also response #2 and 3 above.

6. Comment noted. The draft plan did address the effects of management actions on the refuge's ecosystems in the "Environmental Consequences" chapter (see pages 276, 306, 324, 336, 349, 361, and 372). However, the Service does not believe the question of habitat improvements is a significant issue for the plan, for the reasons cited on page 33.
7. Management emergencies are addressed in the "common management directions" on page 181 in the draft plan. It is not possible to define all possible situations that might constitute a management emergency. As noted in the text, an example of a management emergency would be if naturally occurring or man-caused actions (e.g., landslides, floods, fires, drought) are adversely affecting refuge resources. To conserve fish and wildlife populations, and thus meet the intent of the Alaska Lands Act, in this situation it may be necessary to permit a habitat improvement that would not otherwise be permitted on all or portions of the refuge.
8. Comment noted.
9. The draft plan text does state that airplanes are allowed as a traditional means of access. Section 1110(a) clearly states that this use can be restricted if the use is demonstrated to be detrimental to refuge resources. The access "common management direction" on pages 196-197 is consistent with the Senate report that you cited.
10. Comment noted. The "Affected Environment" chapter in the draft plan does discuss important components of the refuge's natural diversity and ecosystems (e.g., geology, water, soils, fish, birds, mammals, etc.). The refuge's ecosystems also are generally discussed on page 76. The Service does not have, however, detailed information on the refuge's ecosystems or information on the effects of human disturbance that you noted. As noted on page 186 of the draft, research and management studies are one of the Service's major management directions in all of the alternatives. We also wish to point out that it is not the purpose or intent of this document to provide a detailed, scientific description of the refuge's biological environment. The intent of Congress in using the term natural diversity is discussed on page 188 of the draft plan. Wilderness qualities of the Arctic Refuge are generally discussed in Chapter III, on pages 46-49 in the draft. We do not believe there is a need to discuss the specific items addressed on page 161 for the existing wilderness--Congress designated the Arctic Wilderness because it believed the area met these criteria.
11. We disagree that a worst-case scenario should be used in the plan. The scenarios for each alternative are our projections of what activities are most likely to occur on the refuge. To provide a worst-case scenario in the "Environmental Consequences" chapter just because we have limited information is not a reasonable or realistic projection of the future. Current Council on Environmental Quality regulations on preparing environmental impact statements (Section 1502.22) state that when information is lacking to evaluate reasonably foreseeable significant adverse effects, catastrophic consequences need not be examined if they are based on pure conjecture and are not within the "rule of reason."
12. Comment noted. We do not presently have quantified information on access and transportation in the refuge (with the exception of commercial operators that are under special use permit).
13. See response #11 regarding worst-case scenarios. We have changed the text of the final plan to reflect your data on recreational use of the additions to the refuge.
14. Comment noted. We believe the management alternatives in the draft plan provide for a clear understanding of their intent and provide adequate disclosure. We do not believe it is appropriate to include specific objectives and standards in a general document such as the refuge comprehensive conservation plan. See also response #2.
15. Comment noted. We agree that all of the actions you listed must comply with provisions of the National Environmental Policy Act. Virtually every action the Service takes must comply with provisions of the National Environmental Policy Act.
16. See response #15.
17. We believe the statement on page 188 reflects the intent of Congress regarding the term "natural diversity." The December 1, 1980 Congressional Record - Senate states: "The term [natural diversity]...is not intended to preclude predator control on refuge lands in appropriate instances." The citation in the draft plan, however, was incorrect--it should be S. 15131. See also response #10.
18. Comment noted. The page you referred to is a common management direction that would be implemented under all of the alternatives (with some exceptions for Alternative G). We believe that the level of detail of the alternatives is adequate regarding public access and transportation management for this general plan (see also response #8 to Trustees for Alaska).

We do not believe the refuge comprehensive conservation plan can adequately address recreation opportunity spectrum objectives and limits of acceptable change. These concepts require far more data and analysis than we can do, given our time and funding constraints, in preparing the refuge comprehensive conservation plan. We believe the level of detail provided in the assessment of the alternatives is adequate for the purposes of this general document. Future step-down recreation management plans, called for on pages 200-201 in the draft plan, can explore these concepts in more detail.

During the planning process several individuals and groups noted that aircraft were affecting the quality of their recreational experience in the refuge. The use of aircraft consequently was identified to be a significant issue (see page 35 in the draft). One alternative was included in the plan which would specifically restrict the use of aircraft in part of the refuge. However, the Service does not have the authority, nor does the Service believe it is appropriate, to take this action in all of the alternatives (see response #6 and response #7 to the Wilderness Society).

19. The Service only included the term "overcrowded" on page 200 in the context of a common management direction--it is the intent of the Service to avoid overcrowded conditions. To provide a definition using LAC terminology in this plan would require more data and analysis than the Service can presently provide (see also response #18). Regarding hunting, the Service has no data indicating hunting is adversely affecting refuge resources. Public use, which includes hunting, is assessed in Chapter VI in the draft plan. Based on the projected increases in use, the Service did not determine there would be adverse effects on the refuge's fish and wildlife populations. The Service does not believe it appropriate to do a worst-case analysis of hunting (see response #11).
20. Comment noted. See responses #18 and 19 regarding the establishment of LAC use levels. The Service has no mandates or obligations to address "hunting quality" in the refuge comprehensive conservation plans. Under its memorandum of understanding with the State of Alaska, the Service does not set hunting regulations for big game in Alaska refuges (see also response #4).
21. Comment noted. See response #11 regarding worst-case scenarios. The effects of the alternatives on furbearers, which includes wolves, are assessed in the draft plan (see pages 275, 304, 323, 336, 348, 361, 372).
22. Comment noted. As noted on page 262 of the draft plan, because of the general nature of the assessment and the lack of numerical and statistical information regarding refuge resources, impacts must be often expressed in relative terms. The Service believes the four categories of impacts meet the requirements of the National Environmental Policy Act. Regarding the development of the "1002" area, it would be incorrect to assume development of the "1002" area because under all of the alternatives in this plan the Service would manage the area as a minimal management area--until Congress decides otherwise, development of the "1002" area would be prohibited. (See also response #1 to the National Audubon Society.)
23. We disagree with your comment. The "Affected Environment" chapter only describes the existing environment, while the "Management Alternative" chapter sets general management direction and guidance. It would be inappropriate to include the projected use estimates in either of these chapters. The projected use levels are included in the "Environmental Consequences" chapter as a scenario of what may occur in the refuge in the future. They are included here to provide a basis for assessing the effects of each alternative. The effects of the projected increases in use, including the effects on fish and wildlife, vegetation, and user experiences, are assessed for each alternative in Chapter VI.
24. The effects of increasing public use, which includes increased aircraft use, is generally assessed under both "Recreation" and the "Effects on Wilderness Values" for each alternative (e.g., see pages 278 and 279-281 for Alternative A). See response #11 regarding worst-case analyses.
25. We do not agree with your assertion. The assessment was based on the best available information. For the purposes of this general document, we believe the analysis is adequate.
26. Comment noted. We disagree with your assertion that the discussion on the effects of wilderness values does not adequately describe the effects on experience. The paragraphs on page 279 only note the difficulty in doing such an analysis. We also disagree that the developments and uses permitted under Alternative A would significantly alter the refuge's ecosystems and natural diversity (see also pages 270-276 in the draft). With regards to the effects on the existing wilderness area, the section you referenced only is concerned with the effects of wilderness designation on the non-wilderness portion of the refuge. The effects of the alternative on the "naturalness" of the existing wilderness area are implicitly included in the general discussion of the biological effects and recreation effects of the alternative (see pages 270-276 and 278).
27. We disagree with your assertion that it is necessary to limit hunting of the refuge's sheep population. As stated on page 282, under the scenario more sheep would be harvested in the Atigun Gorge area and that the effects of this harvest on the local population is unknown--we do not know whether there would be a negative impact on the population. However, this is only a possibility, based on future projections. As noted on page 274 of the draft, with continued close regulation of harvest levels projected increases in sheep hunting in Alternative A would not result in significant impacts on the refuge population as a whole. It is further assumed in the scenario that the regulatory process administered by the Alaska Boards of Fish and Game would avoid excessive harvests (see page 262). See also responses #19 and 20.
28. As noted on page 261 of the draft, in all of the scenarios it is assumed that reasonable management practices and the best available technology would be applied. Mitigation is also specifically addressed on pages 381-382.

H

HWW CONSULTANTS
1340 W. 23rd Ave., 8
ANCHORAGE, AK 99503

24 April 1988

Regional Director
U. S. Fish and Wildlife Service
Attn: Bill Knauer
1011 E. Tudor Road
Anchorage, AK 99503

Dear Director:

The following comments are addressed to the draft Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan of the Arctic National Wildlife Refuge.

Reading the plan is made difficult by a lack of consistency between maps in the groups, pages 215-252 and on pages 545-551. Comparing some of the maps that are alike (such as Alternative A map with Alternative A map) is made difficult by a change in how management areas are identified. This could lead to confusion.

In the case of Alternative D (p.233) how does it happen that the northern part of the Sheenjek River has lost its wild-and-scenic status? Whereas, in Alternative D (p. 548), the River was properly defined. What is the explanation for this?

If Alternative H is the one referred to on p. 258, the sentence is not correct; Alternative D in the Appendix P, p. 523 is not as described on p. 258 if a comparison is intended between Alternatives D and H. I should like further explanation to clarify this confusing paragraph.

I am in favor of Alternative G, with the following modifications: I disagree that the use of snowmobiles and all motorized vehicles are as traditional form of transportation, if viewed in the common definition of traditional, something prior to 1900. I also disagree with the allowance of motorboats, airplanes, helicopters, and other motorized vehicles in the various management categories (pp. 173-4) -- and certainly in the Wild and Scenic and in the Wilderness categories. Between 1 October and 1 June snowmobiles can be allowed.

Referring to p. 175, I would omit all boat launch sites, roads.

On p. 177, I am opposed to the allowance of commercial fisheries in both wild-river management and in wilderness management. They should be stricken from being permitted in these management categories.

Director/U.S. Fish & Wildlife Service

H

2

I should like to see Wild-and-Scenic River status conferred on the Chandelar, the Porcupine and its tributary, the Colleen, Rivers.

Sincerely,

Harry W. Wassink
HWW Consultants

699

1
2
3

Responses to Harry Wassink

1. Comment noted. The text in the draft plan only refers to the management alternative figures in the body of the document, with the exception of Table 1 on page 15 in the draft. We have footnoted the table in the final plan and deleted the figures in Appendix P to eliminate this potential source of confusion.
2. Thank you for drawing our attention to this point. Figure 37 was in error in the draft plan and has been corrected in the final plan.
3. The alternative referred to on page 233 in the draft plan did not correspond to either Alternative H on page 534 or Alternative D on page 523, but rather the alternative shown on page 521.

Alternative G
Alternative G is the option of my choice for it supports the existing equilibrium of the area, protecting against disturbances of water quality, local quality of life, noise and exploitation of forest cover and oil. It is also the least costly of all proposals, which is a pleasure to discover, as one has become accustomed to paying more for conservation. That organized recreation would not be developed as it would be in Alternative A, is not unattractive: there should be wilderness areas where skill and self-reliance are ~~needed~~ ^{needed}.

Additional Comments

Qualities I look for in management of national wilderness areas are: 1) continued subsistence use for local populations, 2) protection and expansion of registered natural areas, 3) maintenance of the land's carrying capacity, 4) protection of the tree cover, and 5) restriction of motorized vehicles ^{including} ~~including~~ aircraft). With these objectives in mind, it appears that Alternative G is the most appropriate plan suggested. I would like to think that our national priorities are not only to make use of natural resources available, but to preserve wilderness as a resource in itself. Must we always accept the degeneration of our land in order to acquire the natural resources held within:

cont

necessary. In our prepackaged world, the opportunity for challenging and high quality experiences is increasingly important. Wilderness is not something to be served from a TV dinner, gift-wrapped or transmitted from a video machine - if people would like to have wilderness experiences, they must realize ~~a~~ personal preparation is involved.

In considering all the proposals, one very important issue comes to mind: how will the alternatives affect the lives of residents of Arctic Village and Venetie? Do the proposals put their (subsistence) life style in jeopardy? I think it would be horrific if the government and American people overlooked the ^{land} ~~aboriginal~~ rights of America's aboriginal citizens yet again.

staple here

Sylvia A. Altman
11611 26th Avenue South
Seattle, Washington 98168

March 30, 1988

Arctic Refuge Planning Team
U. S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Sirs:

In regards to the Arctic National Wildlife Refuge, I support
The Last Great Wilderness Alternative G which is the only plan
under consideration that would preserve the integrity of the
entire area under question.

The refuge was established to protect wildlife and wildlife
habitat, not to provide a political playground for humans
who do not appreciate the priceless and irreplaceable nature
of the area. It must be maintained as undeveloped and unmanaged
wilderness, as the vast majority of the public demands.

Please include the "1002" area in your consideration. It will
be destroyed by development unless you act now to save it as a
vital part of the whole ecological system under review.

The Arctic National Wildlife Refuge is a national treasure that
must be preserved forever, according to the will of the people
of this country. Please act accordingly.

Thank you for your attention to this matter.

Yours truly,

Sylvia A. Altman

Sylvia A. Altman

copies to: Honorable Frank Murkowski
Honorable Ted Stevens
Honorable Don Young

fold here

Heather Whitaker
486 Rue Richelieu
Québec PQ G1R1K1
Canada

OR

51 N. Main St
Orono, Maine 04473
USA

REGIONAL DIRECTOR
U.S. FISH AND WILDLIFE SERVICE
1011 E. TUDOR ROAD
ANCHORAGE, ALASKA 99503



Response to Heather Whitaker

1. The full refuge comprehensive conservation plan/environmental impact statement does address the effects of each alternative on the local communities, including residents of Arctic Village and Venetie (e.g., see pages 276-278 for Alternative A). As noted in the text, all of the alternatives (with the possible exception of Alternative B) would maintain opportunities for subsistence use. Alternative B, which is not the Service's preferred alternative, could result in some significant restrictions of subsistence use by Arctic Village and Venetie residents.

ALASKA CONTROLS, INC.

MANUFACTURERS' REPRESENTATIVE

P.O. Box 15809 Anchorage, Alaska 99516-5809 TELEPHONE 907-561-5114 PHONE 907-561-4900

April 12, 1988

Mr. Bill Knauer
U.S. Dept. of the Interior
Fish & Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Knauer:

As you prepare your final comprehensive conservation plan for the Arctic National Wildlife Refuge, please consider the following recommendations and observations and use them to the best of your ability in the final products.

Fish & Wildlife officials are to be commended for the professional manner in which the draft document has been developed and for delineating the several options for management open to the Service with such clarity.

After reviewing the options, it is clear ALTERNATIVE B is the preferred option.

Alternative B designates 8 million acres of the 19 million acre area under study as Wilderness, along with another 401,000 acres to be designated "Wild River" Management. Of the total 19 million acres of federal lands, 26%, or about 5 million acres would be open to some degree of economic development such as fish hatcheries and dikes, with 11% or 2 million acres of that total available for significant, economic development opportunities such as oil and gas leasing provided Congress authorizes such activities through specific legislation.

It appears that Alternative B provides a balance between those who would have the entire area designated as Wilderness and those who would open the entire area to intensive economic development opportunities. Furthermore, Alternative B assures a high level of protection of fish and wildlife resources is maintained, that air and water is protected and that the cultural resources of the area will be made secure including those areas in which oil and gas development might be allowed.

Alternative B represents a sensitive and sensible approach towards management of this area of Alaska. This alternative should be the designation of choice of the Service. Thank you for allowing our participation in the process.

Sincerely,
Ann M. Curtis
Ann M. Curtis
Administrator

April 16, 1988

Arctic Refuge Planning Team
U.S. Fish and Wildlife Service
1011 East Tudor Rd.
Anchorage, Alaska 99503

Dear Women and Sirs;

I am deeply concerned with the battle that has been raging between the Reagan Administration's Department of Interior and concerned citizens in Alaska and across the nation over prospective oil development in the Arctic National Wildlife Refuge.

After giving careful thought to the long-term economic, social, and environmental impacts of opening the coastal plain to oil development, I have concluded that the entire 19,200,000 acre refuge - especially the coastal plain - should receive wilderness designation.

In your ANWR Draft Comprehensive Conservation Plan (CCP) you failed to include the "1002" area of the coastal plain, stating that the 1002 report is sufficient and that Congress will decide on the future management of the 6.5 million acre area. This is purely a political decision, since the revised 1002 report is designed to support development in the refuge.

It is incomprehensible to me that after years of public comment with overwhelming support for wilderness designation of ANWR that there is still so much controversy with this issue. According to your own statistics, 77% of the written comments you received support the "Last Great Wilderness" proposal, alternative G.

I strongly object to this administration's continued pro-development bias in the face of public and professional support for ANWR wilderness designation, and urge you to give maximum protection to fish and wildlife in their natural diversity, the purpose for which the refuge was created.

Also, none of the CCP alternatives are designed around the

Heather Koon
 408 1/2 Lakeway
 Bellingham, WA 98225
 (206)671-5147

subsistence uses or needs of local people. I encourage the U.S. Fish and Wildlife Service to begin a training program with the aim of filling future refuge employment positions with local people. Interaction between refuge management officials and local communities is necessary for harmonious coexistence.

Sincerely,

Alison L. Hedberg

Alison L. Hedberg
 SRA 8899
 Indian, Alaska
 99540

Arctic Refuge Planning Team
 U.S. Fish and Wildlife Service
 1011 East Tudor Road
 Anchorage, AK 99503

Wednesday, March 30, 1988

To the Planning Team and other Esteemed Readers:

I cannot express strongly enough my disappointment in the U.S. Fish and Wildlife Service. Your blatant disregard for overwhelming public opinion is nothing less than a National disgrace.

Your own statistics revealed that a 77% majority of public comments favored a Last Great Wilderness alternative (Alternative "G"). Initial professional recommendations called for wilderness status for the entire refuge. You have ignored both of these valuable inputs.

The purpose of a wildlife refuge is to protect and maintain biotic diversity on a pristine land base. Your preferred alternative, "A", is not consistent with this purpose. To claim that it is, is to play the public for fools.

I suggest that you cease to regard us, the public, as being so easily deceived. Most of us are well-educated on the issue and will use our status as registered voters to support our convictions.

It is obvious that you have knuckled under to political pressure from an industry-biased administration. I, and many others, will not tolerate this.

I support Alternative "G".

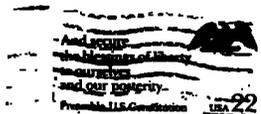
Sincerely,

H Koon
 Heather Koon

cc: Senators Murkowski and Stevens
 Representative Young
 Secretary Hodel

4/11/88

Postmark: CITY, SD 57701, 1988



DEAR SIR:
I REQUEST YOUR
CONSIDERATION OF
WILDERNESS DESIGNATION
FOR ALL OF THE
ARCTIC NWR. IT IS
CRITICAL HABITAT
THAT MUST NOT BE
DEVELOPED!

To U.S. FISH & WILDLIFE SERVICE
ATTN: BILL KNAUER
1011 EAST TUDOR ROAD
ANCHORAGE, AK 99503

From

Mr. Daniel Kruse
8 Dudley
Deadwood SD
57732

Daniel Kruse

Make sure your recipient can read your return address so that they can let you know where they stand on this important issue

Feb. 27, '88

To whom it may concern:

I submit that I support
Alternative "G" of the Draft Comprehensive
Conservation Plan for the Arctic National
Wildlife Refuge. Designate all eligible land
as wilderness, but include the coastal
plain too!

Kim McCutcheon
P.O. Box 303
Navarro, CA. 95463

Dear Sirs;

I realize the deadline is fast approaching for the closing on comments over alternatives for the Arctic National Wildlife Refuge. I believe I wrote earlier last April (1987) and would like to comment one last time.

I have lived here in Arctic Village for the last 9 years. During that time, I have seen alot of the country, both on foot and by snowmachine; From the mouth to the headwaters of the Ottertall River, the Wind River, the Junjik River, Water Creek and far up that watershed to the rugged mountains beyond. This country is so beautifully unique it would be a real tragedy to alter it in any way. Things grow and change so slowly I don't think the land could handle recreational use. (development?) that some of the Refuge alternatives would allow; here are foot trails used by the natives hundreds of years and still visible like they were made yesterday, there you see atumpa still standing from trees cut 50-100 years ago. I've seen these and other signs over and over again, and I wonder what would the land look like if 20,30 -100 times the present users were allowed access to it.

I am totally for Alternative G; total wilderness. I know I can speak the same for all the old people who are unable to write but have voiced their concerns to me over and over again; no development, no more guides, no large groups of hikers, campers. People have to realize we are talking of an area that can change (or recover) at only a snails pace, where trees growth is measured in fraction of inches per year and lichen ground cover in decades. It is really a poor supporter of game animals, consequently it can only support a few animals per several square miles; increased guiding/hunting would cause irreparable harm to their populations.

I wish more people could actually see the area to see for themselves how incredibly fragile it really is and why any kind of increased use/development would alter it forever.

The young folks here in town feel just as strongly and I'm presently urging them to write their comments now also.

I don't want to sound melodramatic, but it really would be a tragedy if any kind of increased use other than Alternative G was allowed.

Sincerely, *Steve Lee + Rose Lee*
Box 22044
Arctic Village, Ak. 99722

Sarah Muckerman
1403 A Woodland Dr.
Richmond Heights, MO
63117

Bill Knauer - Regional Director
Fish & Wildlife Service
1011 East Tudor Rd.
Anchorage, Alaska 99503

918 16th Street #6
Santa Monica, CA 90403

April 20th 1988

U.S. Fish and Wildlife Service
Attn: Bill Knauer
1011 East Tudor Road
Anchorage, AK 99503

Dear Mr Knauer

We are writing with comments on the Fish and Wildlife Service's recently released draft Comprehensive Conservation Plan for the Arctic Refuge, produced in response to the Alaska Lands Act.

The draft CCP is a woefully inadequate planning effort. It can hardly be considered a "comprehensive" management plan, for it omits the biological heart of the 19 million-acre refuge: the 1.5 million acres of the Arctic Coastal Plain. Although the area is referenced in the Interior Department's 1002 Report, this report is not a land management plan. In addition to being totally unsuitable for oil drilling, the Arctic Coastal Plain is now getting such attention nationwide that increased recreation in the area is inevitable. This means that carrying capacity studies should be undertaken to determine what types and degrees of use the refuge can stand. Moreover, the draft CCP does not foreclose future commercial development, such as mining and commercial timber cutting, in an area that should without question be in the National Wilderness Preservation System. Congress ordered the Fish and Wildlife Service to determine all non-wilderness refuge lands to determine their wilderness suitability, yet the Arctic Coastal Plain was not considered.

Our recommendations are:

The entire refuge should be given wilderness designation.

A revised draft plan for the Arctic Refuge should be prepared, that includes the coastal plain and considers it for wilderness designation.

Permanent structures, including onshore facilities in support of offshore oil and gas activities should be prohibited.

Commercial timber operations and other development should be prohibited.

Carrying capacity studies should be undertaken to prevent resource damage from recreational overuse.

We hope you will take these views into consideration when you determine your next actions.

Sincerely,



Johanna D. Moore and Nigel H. Goddard

Dear Bill Knauer:

April 19, 1988

I am writing to you to tell you about my concern for the land in Alaska. I would like all of the Arctic National Wildlife Refuge (ANWR) designate as wilderness area. In you Draft Comprehensive Conservation Plan (DCCP), I feel that you should vote/propose for all the areas to be designated as wilderness areas.

We have very little land left to propose as wilderness areas and we need to start to think about our future wilderness, because if we don't we will have no wilderness to leave to our children.

Sincerely,



April 21, 1988

Regional Director
Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503
Attention: Bill Knauer

Re: Draft Comprehensive Conservation Plan (DCCP) - Arctic
National Wildlife Refuge

Dear Mr. Knauer:

I am writing to support the implementation of Alternative G, "The Last Great Wilderness", with regard to the management of the Arctic National Wildlife Refuge ("ANWR"), outside of the coastal plain.

This alternative is the most economical of those proposed, and would allow the refuge to be maintained in a pristine state. There are very few opportunities left in America to preserve our nation's heritage of wilderness for future generations. The selection of Alternative G would allow us to maintain the majestic grandeur of what really is our "Last Great Wilderness" and would ensure that its future would not be compromised by what are, essentially, short-range goals. To leave the door open to development schemes that could cause irreparable harm is simply not conscionable, and is certainly not the legacy we should leave.

Accordingly, I strongly support the adoption of the most appropriate alternative - Alternative G.

Respectfully,

Lia Peterson, Esq.

730 Bard Ave.

SI, NY 10310

March 16, 1988

Arctic Refuge Planning Team
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Planning Team:

My wife and I are frequent visitors to Alaska, having thus far made 13 wilderness expeditions to the state. Two of those trips have been to Arctic NWR, for a total of six weeks in all. It greatly disturbs us that consideration is now being given to opening up the refuge for development.

We would like you to know that we strongly support wilderness designation for the entire refuge. In our opinion, the refuge's wilderness qualities and wildlife habitat are far too important to endanger for short-term and questionable economic gains.

As the Planning Agency in charge, we ask you to do all you can to insist that the Arctic NWR remains a true wilderness area in the spirit that the refuge was established.

We would appreciate it if you would keep us informed of your decision.

Sincerely,

Larry Rice Judy Bradford

Larry Rice and Judy Bradford
Marshall State Fish & Wildlife Area
RR 1, Box 238
Lacon, IL 61540

March 9, 1988
Box 80
Venetie, AK.
99781

Regional Director, Attention: Bill Knauer
U.S. Fish and Wildlife Service
Region 7, 1011 E. Tudor Rd.
Anchorage, AK. 99503

Dear Mr. Knauer,

We are writing to comment on the Draft Summary of the Arctic National Wildlife Refuge Comprehensive Plan. As stated on page 16 of the summary, "The Arctic Refuge wilderness qualities stand out among its special values. The need to preserve a portion of the Brooks range and arctic Alaska's great wilderness values formed the original basis for establishing the Arctic Range."

Alternative G best meets the goals of maintaining the great wilderness value of ANWR. Subsistence use would still be permitted, but oil and gas development would not be allowed. It would be hard to argue that oil and gas research or development are compatible with wilderness values. By designating 9,691,000 acres as wilderness, the integrity of this great ecosystem is best maintained for future generations. Alternative G is also the least costly of all the alternatives. Anything short of this leaves the possibility for future 1002 type politics. The U.S. Fish and Wildlife Services preferred alternative A which proposes no more wilderness designation in ANWR smacks of suspicion and brings to question the U.S. Fish and Wildlife's supposed goal of protecting the wilderness qualities of the area.

We have both spent considerable amounts of time in ANWR and plan more trips in the future. ANWR is one of our nation's priceless treasures. Alternative G would best protect this great arctic ecosystem.

We would also like to go on record saying that we feel the 1002 area should also be designated as wilderness to assure the protection of the Porcupine caribou herd.

Sincerely,

Christopher R. Scantton
Pamela Scantton

MOORHEAD STATE UNIVERSITY

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February 3, 1988

Arctic Refuge Planning Team
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Sirs:

Please accept the following comments on the Arctic Refuge Comprehensive Conservation Plan.

The draft plan provides an adequate description of the affected environment, biological resources, land status and planning process.

However, as a land management plan for this extraordinary natural resource, it is seriously deficient. It fails to adequately recognize the premier wilderness values that can be found nowhere else on American soil. It fails to assure protection of this area's unsurpassed wildlife population, it fails to assure maintenance of the refuge's wild and undeveloped character, and it fails to provide assurance that future generations will continue to see this part of the world as it was before the arrival of modern civilization. Finally, the plan fails to meet its stated criteria of best meeting the stated purposes of the refuge and best meeting the public interest.

Clearly, this document when reduced to its essentials, is obviously an attempt to justify a political directive from an anti-wilderness, anti-conservation administration. It represents an abandonment of professional resource management and planning ethics by the agency.

The Last Great Wilderness Alternative (alternative G) would best meet the purposes of this superlative resource and would be most consistent with the public interest. Some of its specific provisions I would like to see implemented include: maintenance of wildlife populations and habitats in their natural condition, without heavy handed agency management programs, maintenance of high quality opportunities for hunting, fishing, trapping and other recreational activities, minimizing government involvement in such activities, elimination of all government buildings in the refuge, reduce the number of inholdings, restructure the use of agency helicopters, prohibit motorboats on wild rivers and on mountain lakes, designate the entire refuge as wilderness and develop specific management standards that would ensure that the refuge's natural values will not be lost or diminished.

Please reconsider your responsibility for this exceptional resource and establish the Last Great Wilderness Alternative as the agencies preferred alternative.

Sincerely,

Bill Violet
Bill Violet
Assistant Professor of Acct. Moorhead, Minnesota 56560

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UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
REGIONAL OFFICE
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